FIVE QUESTIONS – ONE MISSION

Better Lives for Kentucky's People

Kentucky Council on Postsecondary Education

Ten Year Anniversary Assessment

of

Kentucky's "Bucks for Brains" Initiative

October 2007

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Leon Zernitsky/SIS Illustrations

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Bradford L. Cowgill
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Dear Fellow Kentucky Citizens:

In May 2007, we celebrated the 10th anniversary of postsecondary education reform in Kentucky. *The Kentucky Postsecondary Education Improvement Act of 1997* (HB 1) was passed to ensure a comprehensive reform of the Commonwealth's entire system of postsecondary education. Six legislatively mandated goals were established to improve the economic prosperity of Kentuckians through the vehicle of increased postsecondary educational attainment. This landmark legislation created the Council on Postsecondary Education (CPE) and charged this agency with responsibility for coordinating and assessing progress in achieving the six goals of postsecondary education reform.

House Bill 1 also provided the foundation for the creation of a unique incentive program, commonly referred to as the "Bucks for Brains" initiative, to dramatically increase the number of endowed chairs and professorships at Kentucky's public universities. Kentucky's investment in Bucks for Brains has demonstrated dramatic success in increasing private donations to our public universities, growing university endowments, expanding endowed chairs and professorships, enhancing intellectual capital, and attracting significant amounts of external funding for research and special programs.

This report provides an overview of Kentucky's historic investment in this innovative program. I am pleased to share with you a sampling of data and profiles that demonstrate the successes of this visionary initiative. However, much remains to be accomplished if Kentucky hopes to achieve all of the goals contained in House Bill 1. We invite your comments and suggestions.

Very truly yours,

Bradford L. Cowgill

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"The Bucks for Brains program has accomplished several things for Kentucky during the past ten years. First, the fundraising capacity of Kentucky's public universities has dramatically increased through matched Bucks for Brains public funds. Second, the program has demonstrated to the higher education community that Kentucky's citizens think education is important as a personal investment. Third, the academic and research quality of our public institutions has been advanced. Finally, the program has demonstrated the importance of higher education research to the development of Kentucky's economy and to the creation of solutions for Kentucky's health and socioeconomic problems."

Paul E. Patton, Governor, Commonwealth of Kentucky 1995-2003

The Vision

The *Kentucky Postsecondary Education Improvement Act of 1997* (HB 1) created the Strategic Investment and Incentive Funding Program (codified as KRS 164.7911) to provide strategic financial incentives to advance postsecondary education. Six distinct trust funds were created: Research Challenge, Regional University Excellence, Technology Initiative, Physical Facilities, Postsecondary Workforce Development, and Student Financial Aid and Advancement. The University of Kentucky and the University of Louisville receive state Bucks for Brains funds through the Research Challenge Trust Fund. Bucks for Brains funding for the comprehensive universities is appropriated through the Regional University Excellence Trust Fund.

HB 1 designated the Council on Postsecondary Education (CPE) with the authority to issue guidelines for the administration of the Strategic Investment and Incentive Funding program (KRS 164.7911 through 164.7927).

The Endowment Match program, also known as the "Bucks for Brains" initiative, was established through the 1998 biennial budget and was designed to attract top researchers to Kentucky. The Bucks for Brains (B4B) initiative requires that universities match the appropriated state funds with donations from philanthropists, corporations, foundations, and other nonprofit agencies. Public and private matched funds are invested and the earnings are utilized to fund faculty positions, research, special programs, or scholarships. The invested principal remains untouched in order to provide a perpetual source of funding to ultimately meet the goals of HB1 through the commercialization of research, the creation of knowledge economy jobs, and the improvement of Kentucky's economy and standard of living.

The Context for the Ten Year Assessment of the B4B Initiative

2007 marks the ten year anniversary of higher education reform in Kentucky including the creation of the Bucks for Brains program. This report examines the impact of the B4B state investment including both short- and long-term goals, qualitative and quantitative outcomes, and anecdotal profiles of selected Bucks for Brains researchers.

In reviewing Bucks for Brains data, it is important to keep several factors in mind that provide an important context for the ten year anniversary assessment of this program.

- **Historical Context:** Although the B4B program was introduced conceptually in 1997 (HB 1 – "Strategic Investment and Incentive Trust Funds"), the program was not actually created until the 1998 biennial budget was enacted. The 1998-2000 budget contained language regarding the creation of the B4B program and the role of CPE in designing and implementing program guidelines and accountability for the trust funds. Actual institutional implementation of the program occurred during the period from 1999 through 2002.

- **Academic Context:** From an academic perspective, the CPE and the public universities required substantial time to create procedural guidelines and the infrastructure to support the implementation of the B4B program. The universities needed to engage in a process to identify both potential donors and the discipline-specific endowed chairs and professorships that would utilize the vehicle of B4B funding. In addition to the time required for infrastructure development, faculty hiring processes tend to be highly proscribed, protracted, and very competitive. Faculty searches typically take from six to 18 months to complete and often may be reopened a second time if successful candidates are not identified or hired through an initial search process. With respect to the B4B goal of ultimately stimulating the creation of research-based companies, many traditional academics are admittedly unskilled and disinterested in the business and legal elements required to successfully commercialize research. Additionally, existing faculty promotion and tenure policies do not typically award credit for commercialization activities. Faculty who choose to pursue commercialization opportunities often report that such efforts take time away from their traditional faculty work in the areas of teaching, scholarship, and service.

- **Fundraising Context:** In 1998, institutional fundraising functions and staff were limited at most public universities within Kentucky. Beginning in 1999-2000, public universities began to rapidly expand their respective fundraising activities and staff primarily to serve the B4B fund matching requirements. Fundraising activities by their very nature require time, cultivation, and expertise to identify potential donors for specific academic

disciplines, research, or programs. Also, compared with many other states, Kentucky lacks depth in the number and financial resources of private family or corporate foundations that might potentially provide the matching funds to qualify for the B4B awards. Public universities needed sufficient time to cultivate a "culture of philanthropy" both on their respective campuses and among their pool of potential prospects or current donors.

- **Research and Commercialization Context:** In 1997, Kentucky received relatively small amounts of external federal funding compared to other states of comparable size. In fact, Kentucky's limited extramural research performance is what prompted the creation of the B4B program. Although Kentucky has made admirable progress in dramatically increasing external research funds garnered by the public universities and colleges, other states also have continued to aggressively pursue federal and extramural funding. At the same time, federal funding for research and development as a percentage of gross domestic product (GDP) has actually declined from 1.25 percent in 1985 to about .75 percent in 2006.[1] During the same time period, industry funding of longer term basic research in the United States also has begun to decline due to several factors including the emerging and less expensive research and development (R & D) opportunities in foreign countries.

- **Economic Development Context:** The B4B program has in reality only been fully functioning for about five years due to the time needed to build fundraising and research infrastructure in Kentucky's universities. Five years is an extremely short period of time to realize any significant commercialization events resulting from B4B faculty research. Kentucky must be thoughtful and strategic when investing in "niche" commercialization opportunities generated from university developed intellectual capital. It is also worth noting that only recently did Kentucky create specific economic development incentives for targeted innovation and commercialization activities. Kentucky's educational and economic development strategies must be more closely aligned in the future to effectively leverage state investment in emerging commercialization opportunities. Finally, such investments often by their very nature are highly speculative and statistically only a small percentage will actually succeed. However, if Kentucky failed to continue its investment in research and technology start-up enterprises, the potential opportunity would be missed to experience a "blockbuster" event resulting from research commercialization.

[1] Rising Above the Gathering Storm R&D, pg 7

The Architects of the B4B Program

> "The Bucks for Brains program was a magnificent idea that engaged business and industry to leverage the investment of state dollars. Through the Ashland Foundation, we were able to donate money to every public university within the state of Kentucky. Ashland's donations provided the required match for the Bucks for Brains funding. I'm very proud of being part of Ashland at that particular time."
>
> *Charles Whitehead, former President of the Ashland Foundation, and CPE Chair 1999-2002*

Prior to his election as Governor of Kentucky, Paul E. Patton served as secretary of the Economic Development Cabinet under Governor Brereton C. Jones. Governor Patton understood the direct relationship between educational attainment and economic development. Postsecondary educational reform emerged as a central and enduring public policy initiative throughout both of Patton's terms as Governor. In Patton's inaugural address in December 1995, he called for comprehensive and systemic improvement at all levels of postsecondary education.

In 1996, the General Assembly passed legislation (Senate Concurrent Resolution 93) that created the "Task Force on Postsecondary Education." The task force was appointed May 24, 1996, and consisted of 18 members – with equal members appointed by the Governor, the Senate, and the House of Representatives. Jody Richards (D), Larry Clark (D), Greg Stumbo (D), Danny Ford (R), and Charlie Walton (R) represented the House. John "Eck" Rose (D), Charlie Berger (D), Joey Pendleton (D), David Williams (R), and Charlie Borders (R) represented the Senate. After Berger was defeated in 1996, Tim Shaughnessy (D) replaced him on the task force. Governor Patton, Margaret Greene, Jim Ramsey, Rodney "Biz" Cain, Viola Miller, and Roy Peterson represented the Executive Branch. Later Crit Luallen replaced Greene who left the Governor's Cabinet to return to the private sector.

Approximately 275 citizens from across Kentucky were organized into advisory groups that included business leaders, university presidents (public and independent), community college and technical program staff, students, and other special interest groups. Following an intensive review of materials and discussion, external consultants from the National Center for Higher Education Management Systems (NCHEMS) and the Education Commission of the States (ECS) were hired to analyze issues and to assist with the preparation of a comprehensive report.

In March 1997, the Task Force on Postsecondary Education released its final report and recommendations. The task force report provided the foundation for systemic reform of Kentucky's postsecondary education institutions including the creation of the

six investment and incentive trust funds to advance the goals and objectives of postsecondary education. The report's key findings included the following:

> "Kentucky seriously lags the nation and competitor states in research and development activity."
>
> *Postsecondary Education in Kentucky: An Assessment – March 1997, page 6*

In developing his plan for reforming higher education in Kentucky, Governor Patton discussed his ideas with many experts both in and outside of Frankfort. The original idea to enhance research by dramatically increasing the number of endowed chairs at Kentucky's universities emerged from a dinner conversation that Governor Patton had early in his first term with David Hawpe of the Louisville Courier Journal newspaper. Later Governor Patton met with Ron Greenberg and Hank Wagner of Jewish Hospital in Louisville and the notion of bonding a very significant investment of capital to fund the creation of more endowed chairs developed. The new program initially was referred to as "Bonds for Brains." Ron Greenberg apparently coined the enduring and descriptive phrase "Bucks for Brains" to describe Kentucky's proposal to create an endowment match program.

Governor Patton directed Mr. Greenberg to elaborate on these ideas and to create a final proposal working with Skipper Martin and Crit Luallen from the Governor's Office and Dr. James Ramsey who was serving as the state budget director. Once the defining elements of the Bucks for Brains initiative were articulated, it was then necessary to obtain legislative support. A series of meetings with key legislators took place and strong bipartisan and bicameral support for the program began to develop.

Governor Patton credits the members of the Kentucky legislature for their collective leadership in the creation of the Bucks for Brains program through enabling legislation passed during the 1997 Special Session. However, clearly it was Governor Patton who provided the vision and the gubernatorial leadership for higher education reform which included the very innovative and unique Bucks for Brains program.

The primary goal of postsecondary education reform in 1997 was:

> "To assure that Kentucky's postsecondary and technical education system is positioned to provide the human capital necessary to be a leader in the global economy of the 21st century."
>
> *Cover Letter from Governor Paul E. Patton – Postsecondary Education in Kentucky: An Assessment – March 1997*

Genesis of the Bucks for Brains Program

The *Kentucky Postsecondary Education Improvement Act of 1997* (HB 1) created the Strategic Investment and Incentive Funding Program or "trust funds" that enabled state appropriations to finance the Bucks for Brains program at Kentucky's public universities. The Kentucky 1998-2000 biennial budget bill created the original funding mechanism to implement the B4B program.

The Council on Postsecondary Education was charged with the responsibility for designing and implementing specific guidelines for the trust funds that would advance the goals of HB 1. The Kentucky Postsecondary Education 1998-2000 Trust Fund Guidelines provide specifications for the implementation of the program. For example, the guidelines specify that for the Research Challenge Trust Fund, 70 percent of program funds at UK and UofL must support programs or disciplines in five "new economy" priority areas:

- Human health and development
- Biosciences
- Materials science and advanced manufacturing
- Information technologies and communications
- Environmental and energy technologies

Appropriations for trust funds must adhere to all statutory allocation guidelines and do not lapse at the end of the fiscal year. Interest is earned pending distribution of the funds. In addition, the guidelines require that by October 15 each year, the public universities must complete an annual report to be submitted to CPE that outlines program activities and outcomes, uses of funds, and matching requirements. The respective institutional governing boards are charged with reviewing and approving matching gifts and pledges and with overseeing the implementation of the B4B program according to the prescribed guidelines.

Goals for the Bucks for Brains Program

The architects of the B4B initiative and the legislators who supported the enabling legislation for the program understood and embraced the intended positive causal relationship between enhanced university research and the potential for improved local and state economic development.

Short-term goals for the Bucks for Brains (B4B) program included:

1. Enhanced fundraising by the universities.
2. Growth of university environments.
3. Increases in the number of endowed academic chairs and professorships.

4. Significant progress in attracting externally funded research to the public universities.

Long-term goals for the program focused on:

5. Commercialization of research.
6. Stimulation for university and research related business development.
7. Creation of jobs.
8. Facilitation of Kentucky's transition to a knowledge-based economy.

Overview of Short-Term B4B Goals

Analysis of B4B institutional data overwhelmingly demonstrates the success of the state's financial investment in accomplishing the short-term goals for the program.

1. Fundraising

Kentucky's public universities raised significant private funds through the endowment match program.

Institutional Match Funds 1997-2006

University of Kentucky	$153,722,882
University of Louisville	82,731,805
Eastern Kentucky University	10,213,837
Kentucky State University	1,745,683
Morehead State University	6,645,655
Murray State University	8,380,683
Northern Kentucky University	8,033,753
Western Kentucky University	10,746,183
Total	$282,220,481

(Plus $28.5 million in additional pledges)

2. University Endowments

Endowments have grown significantly at Kentucky's public universities.

Since the inception of the B4B program, the market value of Kentucky's public university endowments has grown from $479 million in 1997 to $1.6 billion in 2006, more than a 230 percent increase.

3. Endowed Chairs and Professorships

Kentucky's public universities have dramatically increased the number of endowed chairs and professorships.

156 B4B endowed chairs have been created.
259 B4B endowed professorships have been created.

The total number of endowed chairs has increased from 55 in 1997 to 211 in 2006, an increase of 284 percent. The total number of endowed professorships has increased from 53 to 312 (489 percent).

4. Externally Funded Research

Significant progress in attracting externally funded research to Kentucky's public universities has occurred due to the B4B program.

Between 1997 and 2006, federal R & D expenditures at the research universities increased from $76 million to $222 million, or by 192 percent. Extramural R & D expenditures increased from $105 million to $327 million, or by 211 percent.

Overview of Long-Term B4B Goals

Progress in achieving the long-term goals of the B4B investment has been demonstrated, but an extended period of investment will be required in order to realize the intended economic development outcomes from the program. As previously noted, the B4B program has only been fully operational for five to six years which is a very short timeframe in which to realize any commercialization results from research. However, several significant successes and growth trends may be noted with respect to the longer term goals for the B4B program.

5. Commercialization of Research

In 1997, no university research generated start-up companies were reported by UK and UofL on the Association for University Technology Managers (AUTM) annual survey. In 2006, UK and UofL reported the formation of a total of 11 start-up companies.

6. University and Research Related Business Development

Invention disclosure reported by UK and UofL on the AUTM annual survey increased from 70 in 1997 to 157 in 2006. Reported licenses and options executed by UK and UofL grew from six in 1997 to 31 in 2006. Reported active licenses and options grew from 59 in 1997 to 142 in 2006.

7. Job Creation

The University of Louisville and the University of Kentucky have begun to tabulate the tangential impact of B4B chairs and professors on the recruitment of other researchers to their respective institutions. For example, since Dr. Donald M. Miller became the director of UofL's James Graham Brown Cancer Center in 1999, he has recruited more than 75 new clinical and research faculty to the institution. These newly recruited cancer center faculty members are creating groundbreaking research on cures for a variety of cancers. Jason Chesney's research has demonstrated that a drug originally developed for diabetes can significantly shrink tumors caused by malignant

melanoma. John Eaton and Robert Mitchell have created a lung cancer vaccine that shows promising results in mice.

8. Transition to a Knowledge-Based Economy

Due to the relatively short duration of the Bucks for Brains program, it is difficult to accurately estimate the impact of the Endowment Match Program in facilitating Kentucky's transition to a knowledge-based economy. However, Appendix A features a preliminary analysis of the regional impacts of the Bucks for Brains program by University of Louisville economist Professor Paul Coomes and University of Kentucky economist Dr. Kenneth Troske. In this report, Professors Coomes and Troske provide estimates regarding the cumulative economic and fiscal impact of the Bucks for Brains program at UK and UofL.

Utilizing the IMPLAN regional input-output modeling system, Professor Coomes estimates that UK and UofL scholars (partially sponsored by the B4B program) have generated $442 million from federal and out-of-state funding sources. He further estimates that the "combined external funds attracted by B4B scholars are associated with $762.5 million in sales to establishments statewide (including the university revenues) over the decade." (*The Regional Economic Impacts of the Bucks for Brains Program - Dr. Paul Coomes and Dr. Kenneth Troske, page 1)*

Furthermore, Professor Coomes and Troske's analysis estimates total associated employee compensation for B4B scholars as $278.8 million which generates $19.5 million in Kentucky sales and income taxes as well as local occupational taxes of $3.3 million. Externally generated B4B research funding also supports over 2,100 jobs statewide.

The Investment

"By focusing our Bucks for Brains funding in a few key areas, Kentucky has the greatest opportunity to realize overwhelming success from this program. For example, the University of Louisville has focused on the health sciences; specifically, areas like cardiovascular disease, microsurgery, and cancer. With focused investment of Bucks for Brains funding, the potential for groundbreaking translational research is maximized. The recently released cervical cancer drug is an excellent example of the potential impact of focused funding for translational research that has the capacity to improve the lives of Kentuckians."

Ron Greenberg, Former Chair of the Council on Postsecondary Education

The following information outlines the time frames and sources for Kentucky's $350 million investment in the Bucks for Brains initiative.

Biennial Budget	Amount	Source
1998-2000	$110 million ($100 million Research Challenge Trust Fund with two thirds to UK and one third to UofL) ($10 million to Regional University Excellence Trust Fund)	General Fund
2000-2002	$120 million ($100 million to Research Challenge Trust Fund with two thirds to UK and one third to UofL) ($20 million to Regional University Excellence Trust Fund)	General Fund
2002-2004	$120 million ($100 million to Research Challenge Trust Fund with two thirds to UK and one third to UofL) ($20 million to Regional University Excellence Trust Fund)	Sale of Taxable Bonds

Total State Investment = $350 million

The Return on Investment

"The Endowment Match Program (EMP) has been a critical part of the University of Kentucky's effort to achieve the legislative mandate that it become a top 20 public research university by 2020. Bucks for Brains has strengthened the university's human capital, resulting in significant improvement across a range of measures of institutional quality. The program has transformed the university's culture to one of excellence. And EMP has had a remarkable impact on the university's broader fundraising efforts. As the University of Kentucky continues to pursue its mandate through the implementation of the Top 20 Business Plan, the resources provided by the EMP will be essential to progress."

UK – Bucks for Brains Institutional Progress Report, 2007

As of 2006, some highlights of the successful return on investment of the Bucks for Brains program include:

- **47 percent** increase in annual giving at UK and UofL.
- **$1 billion** increase in the market value of endowment assets at UK and UofL.
- **156 B4B endowed chairs** and **259 B4B endowed professorships** appointed at Kentucky's public universities.
- **18 percent** (approximately) of all federal R&D expenditures generated by B4B faculty.
- **12 percent** (approximately) of extramural R&D expenditures generated by B4B faculty.
- **16 percent** (approximately) of all licenses/options generated by B4B faculty.
- **30 percent** (approximately) of all new U.S. patent applications generated in Kentucky have been by B4B faculty.
- **36 percent** (approximately) of Kentucky start-up companies that were dependant on university generated technology have been created by B4B faculty.

Analysis of Progress on Program Goals and Outcome Measures

This section identifies research questions and indicators for measuring progress toward goal attainment.

Analysis of Fundraising/Annual Giving

The Kentucky Postsecondary Education Improvement Act of 1997 (HB 1) established aggressive goals for the University of Kentucky and the University of Louisville. By the year 2020, UK is to become a major comprehensive research institution ranked nationally in the top 20 public universities and UofL is to become a premier, nationally recognized, metropolitan research university. These goals challenged the universities on many fronts, not the least of which was in the area of private giving. In 1997, the University of Kentucky received $41 million and ranked 35th among public universities in terms of the amount of voluntary support given to the university from private sources (The Center for Measuring University Performance Annual Report entitled *The Top American Research Universities*). That same year, Michigan State University received $72 million in philanthropic support and ranked 20th among public universities. This means that annual giving at UK was $31 million below that of the 20th ranked institution at the time HB 1 was enacted. The University of Louisville faced a similar challenge. In 1997, UofL ranked 32nd among public universities in philanthropic support ($46 million), placing the university well below benchmark metropolitan, public universities, such as the University of California–San Diego, which received $88 million and ranked 17th.

When the Bucks for Brains program was created, one of the principal goals of program architects was to encourage private support of public higher education research activities. The mechanism for stimulating private giving was a matching component incorporated into program guidelines that required state funds to be matched with private donations. The program encourages private giving by enabling donors to "double their contributions" to the public universities by having those contributions matched dollar-for-dollar by the state. Both state and private funds are endowed and the proceeds are used to encourage research at the University of Kentucky and the University of Louisville and to strengthen key programs at Kentucky's comprehensive universities.

This report examines four research questions related to the goal of encouraging private giving to Kentucky public universities:

1. Have **levels of annual giving** to Kentucky public universities increased over the 10-year period since implementation of the Bucks for Brains program?

2. How does annual giving at Kentucky public universities **compare** to annual giving at **benchmark** institutions?

3. To what extent did the **Bucks for Brains** program **contribute** to increased levels of annual giving at Kentucky public universities?

4. How much **private support** of public higher education has been **leveraged** through the Bucks for Brains program?

The main indicator for gauging progress toward this goal is annual giving. Annual giving is defined as the amount of total voluntary support received by a university during the fiscal year, as reported in the Council for Aid to Education's (CAE) Voluntary Support of Education Survey (VSES). The VSES is recognized as the authoritative national source of information on private giving to higher education and private K-12 schools. The survey is administered on an annual basis and has been in operation for more than 40 years.

1. <u>Levels of Annual Giving</u> – Levels of annual giving to Kentucky public universities increased in the decade following Bucks for Brains program implementation. As can be seen in Table 1, between 1997 and 2006, annual giving to Kentucky research universities grew from $87.7 million to $128.6 million, or by 47 percent. Over the same time period, annual philanthropic support at the comprehensive universities increased from $11.0 million to $28.9 million, or by 162 percent. The largest dollar increase occurred at the University of Kentucky, which registered a $24.3 million increase for the period, and the largest percentage increase took place at Western Kentucky University (+699 percent).

Table 1
Change in Annual Giving to Kentucky Public Universities
Between Fiscal Years 1997 and 2006 (dollars in thousands)

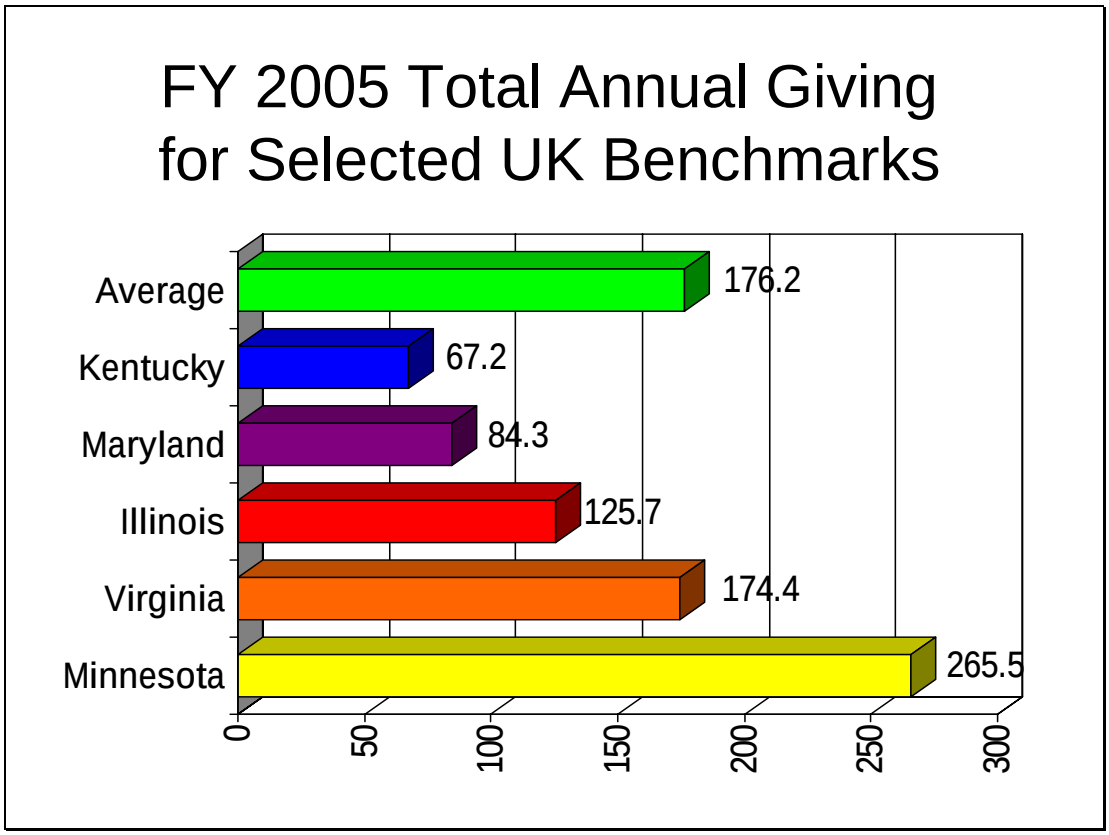
Institution	1997	2006	Dollar Change	Percent Change
University of Kentucky	$41,383	$65,648	$24,265	59%
University of Louisville	46,352	62,934	16,582	36%
Sector Total	$87,735	$128,582	$40,847	47%
Eastern Kentucky University	$4,081	$6,683	$2,602	64%
Morehead State University	2,041	2,727	686	34%
Murray State University	,027	4,065	1,038	34%
Western Kentucky University	1,877	15,002	13,125	699%
Sector Total	$11,026	$28,477	$17,451	162%
Public University Total	$98,761	$157,059	$58,298	59%

These data do not include annual giving numbers for Northern Kentucky University or Kentucky State University, who either did not participate in VSES or did not provide data on a consistent basis.

2. <u>Benchmark Comparisons</u> – Despite an increase in annual giving between 1997 and 2005, the University of Kentucky did not move up in public university rankings of voluntary support and maintained its position relative to its benchmarks. In 1997, the University of Kentucky received $41.4 million and ranked 35th among public colleges and universities nationwide in annual philanthropic support (Center for Measuring University Performance data). Eight years later, in 2005, the level of annual giving at UK increased 62 percent to $67.2 million, but the university fell in public sector rankings to 39th. Compared to its benchmark institutions, the University of Kentucky maintained its relative position of second from the bottom for the period. Only the University of Maryland-College Park ($38.1 million) and the University of Georgia ($60.5 million) had lower levels of annual giving than UK in 1997 and 2005, respectively. These data are presented visually in Graph 1. As can be seen, the level of annual giving at UK in 2005 ($67.2 million) was $109 million below the benchmark average ($176.2 million).

Graph 1

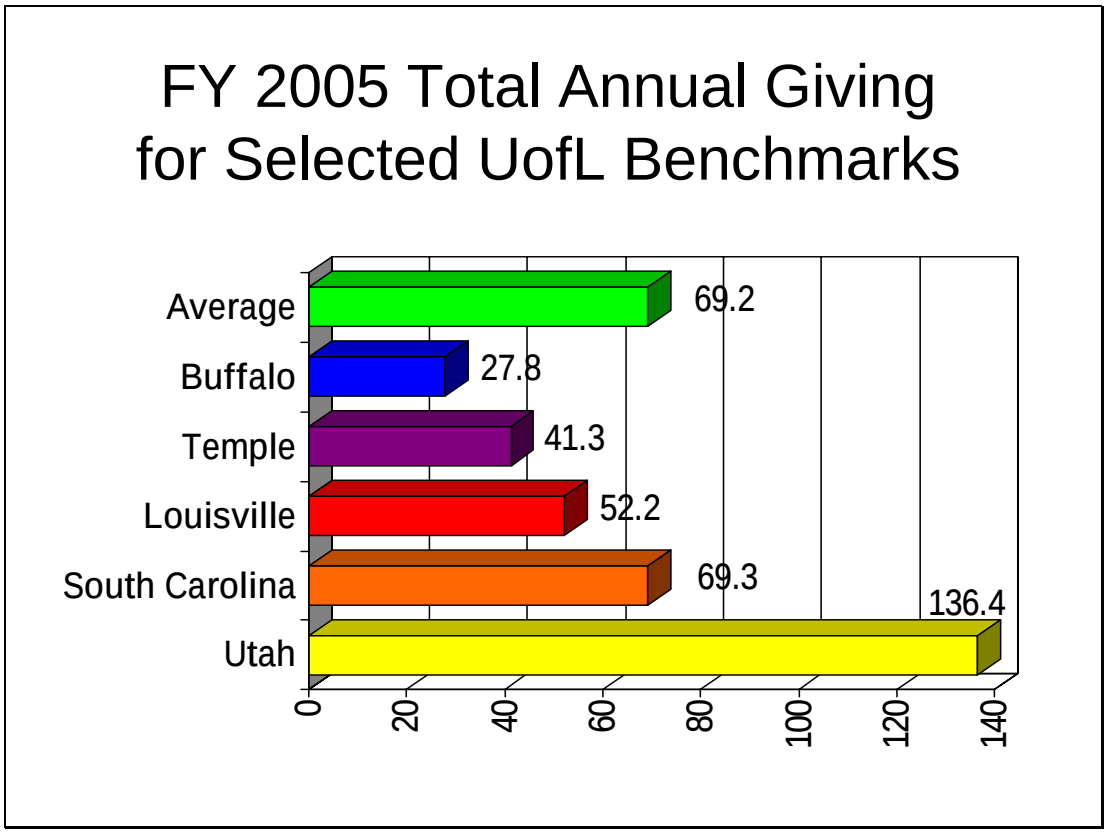
dollars in millions



The University of Louisville lost ground both in public sector rankings of voluntary support and in comparison to its benchmarks. The level of philanthropic support at the University of Louisville increased from $46.4 million in 1997 to $52.2 million in 2005, or by 13 percent (Center for Measuring University Performance data). Despite the increase, UofL fell in public university rankings of annual giving from 32nd to 53rd during this period. In 1997, only five benchmark institutions reported a higher level of voluntary support than UofL. In 2005, nine benchmarks reported higher levels of annual giving. As can be seen in Graph 2, the University of Louisville is positioned near the middle compared to its benchmark institutions, or about $17 million below the benchmark average ($69.2 million). Annual giving among UofL benchmark institutions ranges from a low of $22.4 million at Stony Brook University to a high of $179.3 million at UNC-Chapel Hill.

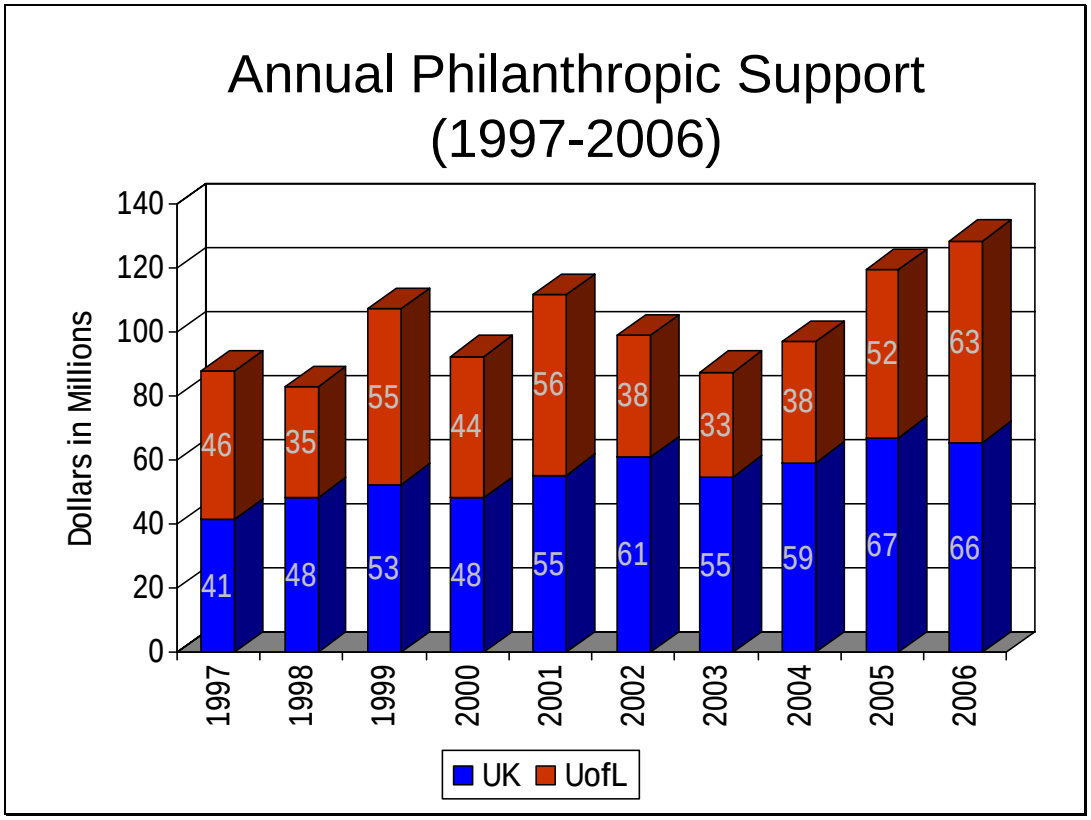
Graph 2

dollars in millions



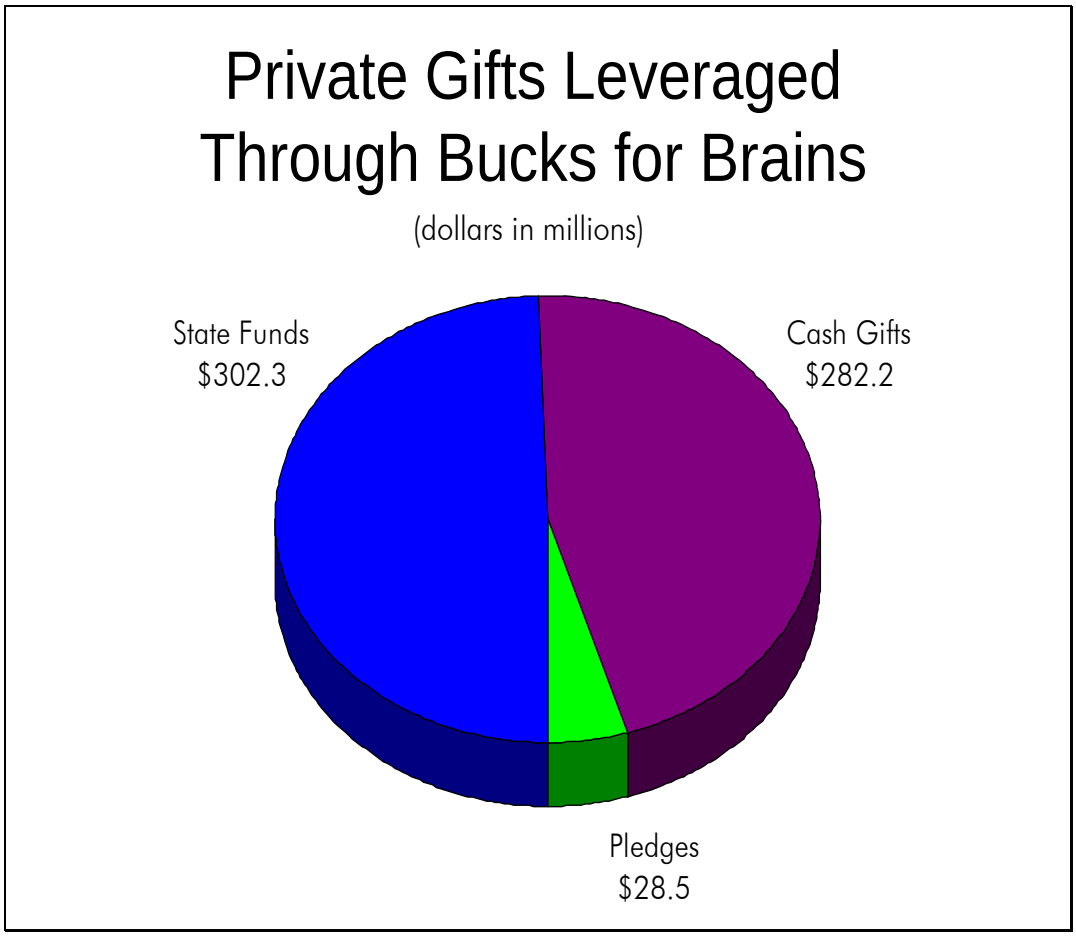
3. <u>Bucks for Brains Contribution</u> – Annual giving to Kentucky research universities has been uneven over the past decade, but peak periods of support tend to correspond with years in which the Bucks for Brains program received an appropriation. As can be seen in Graph 3, annual philanthropic support received by the state's research universities ranged from a low of $83 million in 1998 to a high of $129 million in 2006. There were three peak periods of growth in 1999, 2001, and 2004-2006. Using a time-series pattern matching approach, it is evident that levels of annual giving were higher during the years in which there was an appropriation for Bucks for Brains (i.e., 1999, 2001, and 2004) than they were in years when there was no appropriation. During years in which there was no Bucks for Brains appropriation, annual giving tended to hover between $80 million and $90 million. In the years where there was an appropriation, or in the years immediately following an appropriation, annual giving tended to exceed $100 million. 2005 and 2006 actually reflect the 2004 appropriation since UK and UofL required longer periods of time to identify new B4B donors or foundations to obtain the matched funds.

Graph 3



4. <u>Private Support Leveraged</u> – Since its inception in 1997, the Bucks for Brains program has been an unqualified success in generating private investment in public higher education research activities. As can be seen in Graph 4, through June 30, 2006, participating Kentucky universities received approximately $282.2 million in cash gifts and $28.5 million in pledges from private sources that were leveraged through the B4B program. These funds were matched with $302.3 million in dispersed state funds, which means that $584.5 million has already been added to public university endowments and another $28.5 million will be added when outstanding pledges are paid in full. Proportionately, pledges accounted for about 5 percent of total state and private funds as of fiscal year end. It is worth noting that the cumulative total of cash gifts and pledges generated through the program exceeds the amount of state match by over $8 million. This means the institutions are overmatching state funds with private gifts.

Graph 4



Analysis of University Endowment Growth

A second major goal of the Bucks for Brains initiative architects was to grow public university endowments. In 1997, the University of Kentucky ranked 44th among public colleges and universities in terms of the relative size of its endowment assets (Center for Measuring University Performance rankings). That same year, the University of Louisville ranked 25th.

This analysis examines three research questions related to the goal of growing university endowments:

1. Has the market value of **endowment assets** at Kentucky public universities increased over the 10-year period since implementation of the Bucks for Brains program?

2. How does the market value of endowment assets at Kentucky public universities compare to **endowment** assets at **benchmark** institutions?

3. To what extent did the **Bucks for Brains** program **contribute** to the growth in market value of endowment assets at Kentucky public universities?

The primary source of data on endowment market values is the National Association of College and University Business Officers (NACUBO) Endowment Study. The endowment study is produced annually and typically has a response rate among U.S. colleges and universities that exceeds 80 percent. An additional source of data on endowment market values is the CPE Endowment Match Program Outcome Measures Report (also known as the FD-21 Report) submitted October 15 each year to the Council.

Table 2
Change in Market Value of Endowment Assets
Kentucky Public Universities (dollars in thousands)

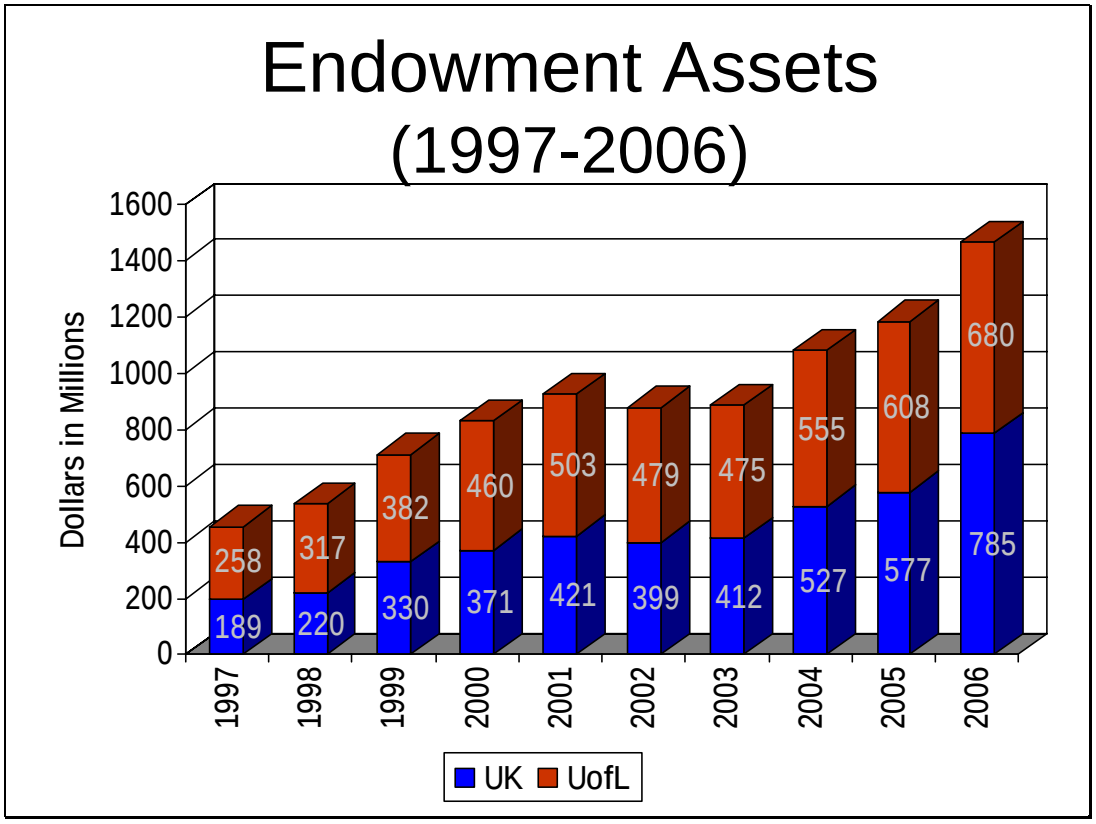
Institution	1997	2006	Dollar Change	Percent Change
University of Kentucky	$189,008	$785,196	$596,188	315%
University of Louisville	258,362	680,251	421,889	163%
Sector Total	$447,370	$1,465,447	$1,018,077	228%
Northern Kentucky University	$12,160	$41,546	$29,386	242%
Western Kentucky University	19,317	85,723	66,406	344%
Sector Total	$31,477	$127,269	$95,792	304%
Public University Total	$478,847	$1,592,716	$1,113,869	233%

These data do not include information for Eastern Kentucky University, Kentucky State University, Morehead State University, or Murray State University who either did not participate in the NACUBO survey or did not provide data on a consistent basis.

1. <u>Endowment assets</u> – The market value of endowment assets at Kentucky public universities has grown markedly in the 10-year period following implementation of the Bucks for Brains program. As can be seen in Table 2, between 1997 and 2006, the market value of research university endowments grew from $447.4 million to $1,465 million, or by 228 percent. Over the same period, the market value of endowment assets at Kentucky comprehensive universities that participate in the NACUBO Endowment Survey increased from $31.5 million to $127.3 million, or by 304 percent. The University of Kentucky experienced the largest dollar increase for the period, with endowment assets increasing by $596.2 million (an increase of 315 percent), and Western Kentucky University recorded the largest percentage increase, with assets growing by 344 percent (an increase of $66.4 million).

Annual growth in endowment assets at the research universities is presented in Graph 5. The graph shows an overall upward trend in endowment market values, but also reveals a stair-step pattern characterized by periods of accelerated growth that correspond to time periods in which the Bucks for Brains program received an appropriation.

Graph 5



2. <u>Benchmark comparisons</u> – The University of Kentucky has made substantial progress in rankings of public college and university endowment assets. Between 1997 and 2005, UK moved up in the rankings of endowment assets among public colleges and universities from 44th to 25th, respectively (Center for Measuring University Performance data). Despite this accomplishment, UK must continue to be aggressive in its fundraising efforts in order to achieve the legislatively mandated top 20 status. For example, the market value of endowment assets at UK ($576.7 million) was $209.4 million below that of the University of Iowa ($786.1 million), which ranked 19th among public universities in 2005.

Despite the rise in rankings, UK has not gained relative to its benchmark institutions. In 1997, the University of Kentucky was positioned near the bottom (fourth from the bottom) relative to its benchmark institutions in terms of the market value of its endowment assets. Only Michigan State University ($179.4 million), the University of Maryland–College Park ($178.5 million), and the University of Arizona ($173.7 million) recorded asset values below UK ($189 million). Four out of five universities in the top quartile among UK benchmarks had endowment assets that exceeded $1 billion (Center for Measuring University Performance data). Eight years later, in 2005, UK's position did not change appreciatively. Despite considerable growth in the

university's endowment assets (+205 percent), it remained near the bottom (fifth from the bottom) compared to its benchmarks. As can be seen in Table 3, four benchmark institutions reported asset values below that of UK (the University of Georgia, the University of Arizona, North Carolina State University, and the University of Maryland–College Park), and nine of the top ten had endowments that exceeded $1 billion. These data are presented visually in Graph 6. As can be seen in the graph, the market value of endowment assets at UK in 2005 ($576.7 million) was well below the benchmark average ($1.4 billion) and even further behind upper-quartile institutions such as the University of Virginia ($3.2 billion).

Table 3
Change in Market Value of Endowment Assets
Between Fiscal Years 1997 and 2005

University of Kentucky Benchmark Institutions (dollars in thousands)

Institutions	Endowment Assets 1997	Endowment Assets 2005	Percent Change
University of Michigan – Ann Arbor	$1,909,282	$4,931,338	158%
Texas A&M University	2,803,890	4,567,265	63%
University of Virginia	1,098,539	3,219,098	193%
University of Minnesota – Twin Cities	1,135,542	1,968,930	73%
Ohio State University – Columbus	767,716	1,726,007	125%
University of Washington – Seattle	527,621	1,489,924	182%
University of North Carolina – Chapel Hill	719,900	1,486,147	106%
Purdue University – West Lafayette	856,693	1,340,536	56%
University of Wisconsin – Madison	651,330	1,000,857	54%
Michigan State University	179,400	906,342	405%
Pennsylvania State University – University Park	399,645	866,788	117%
University of Florida	400,582	835,698	109%
University of Illinois – Urbana-Champaign	356,622	791,787	122%
University of Iowa	357,142	786,100	120%
University of California – Los Angeles	770,148	668,338	-13%
University of Kentucky	189,008	576,721	205%
University of Georgia	249,413	517,170	107%
University of Arizona	173,652	393,400	127%
North Carolina State University	210,706	380,541	81%
University of Maryland – College Park	178,459	290,013	63%

Note: Figures sorted by fiscal 2005 endowment asset values.

These data show that while UK has recorded impressive growth in endowment assets, it moved up only one spot in a rank order list of benchmark endowment assets.

The University of Louisville has climbed in public university rankings of endowment assets since implementation of the Bucks for Brains initiative. In 1997, the market value of endowment assets at UofL was $258.4 million and the university ranked 35th

among public universities nationwide. Eight years later, in 2005, the university's endowment assets totaled $607.6 million and it ranked 24th. That same year, one of the university's benchmark peers, the University of Cincinnati, reported endowment assets of $1.032 billion and was ranked 13th among public universities.
The University of Louisville compares favorably with its benchmark institutions in terms of relative growth in endowment assets. Between 1997 and 2005, the market value of endowment assets at UofL increased by 135 percent. This increase was the fourth highest proportionate gain among the university's benchmark institutions. Only Stony Brook University (+272 percent), the University of California – Irvine (+142 percent), and the University of Utah (+139 percent) recorded a larger proportionate gain for the period. UofL also compares favorably to its benchmarks in terms of overall endowment size. In 2005, the university ranked fifth among its benchmarks in level of endowment assets. Only the University of Pittsburgh ($1.530 billion), the University of North Carolina – Chapel Hill ($1.486 billion), the University of Cincinnati ($1.032 billion), and the University of Iowa ($786.1 million) reported asset values that exceeded UofL's.

Table 4
Change in Market Value of Endowment Assets
Between Fiscal Years 1997 and 2005

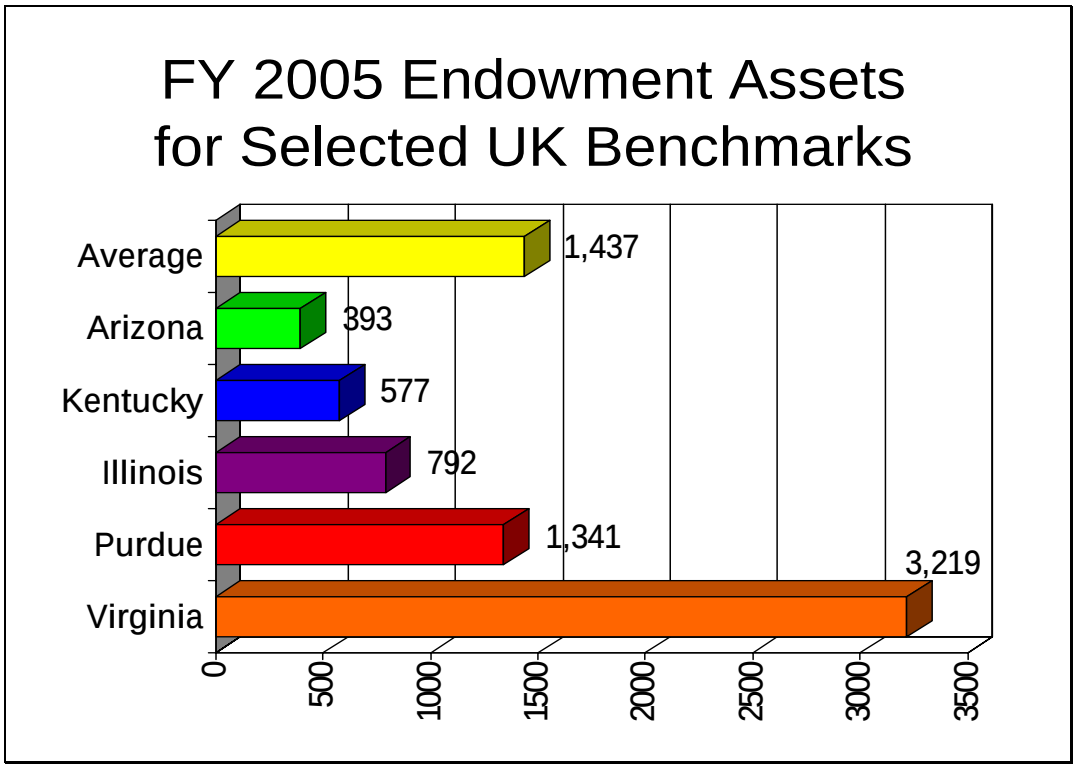
University of Louisville Benchmark Institutions (dollars in thousands)

Institutions	Endowment Assets 1997	Endowment Assets 2005	Percent Change
University of Pittsburgh – Pittsburgh	$651,738	$1,529,884	135%
University of North Carolina – Chapel Hill	719,900	1,486,147	106%
University of Cincinnati – Cincinnati	680,827	1,032,124	52%
University of Iowa	357,142	786,100	120%
University of Louisville	258,362	607,636	135%
University of Utah	192,201	458,531	139%
University of Alabama – Birmingham	172,539	312,072	81%
University of South Florida	146,501	298,241	104%
University of South Carolina – Columbia	146,038	292,562	100%
University of New Mexico – Albuquerque	155,499	245,234	58%
Virginia Commonwealth University	152,181	235,279	55%
University of California – San Diego	140,027	211,178	51%
Temple University	102,838	196,165	91%
Wayne State University	108,529	185,380	71%
University at Buffalo	302,117	172,056	-43%
University of California – Irvine	70,013	169,152	142%
University of Illinois – Chicago	72,439	149,177	106%
Stony Brook University	17,158	63,888	272%

Note: Figures sorted by fiscal 2005 endowment asset values.

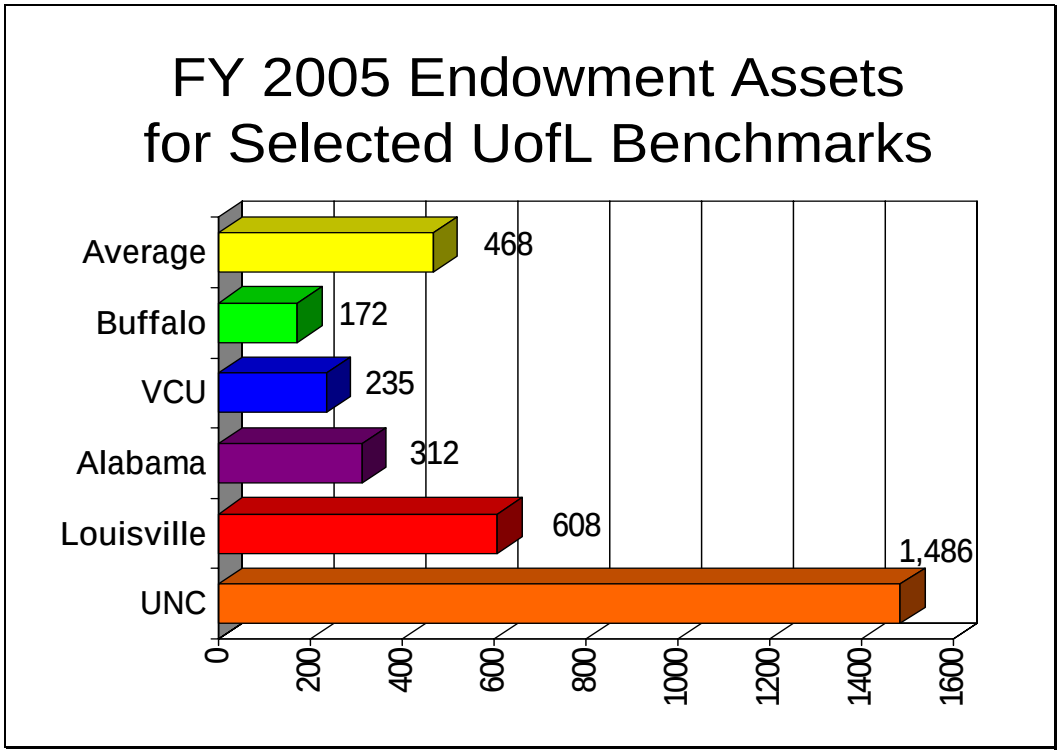
Graph 6

dollars in millions



Graph 7

dollars in millions



3. <u>Bucks for Brains Contribution</u> – The Bucks for Brains initiative has had a direct, positive impact on growth in endowment assets at Kentucky public universities. But what has been the program's contribution to that growth? In this analysis, the program's contribution is calculated by dividing total additions to endowment principal attributable to the B4B initiative (both state funds distributed and cash gifts received) by the incremental increase in endowment assets for the period.

Between 1997 and 2006, Kentucky's research universities added $255.6 million in dispersed state funds and $236.5 million in private cash gifts to their endowments, for a total $492.1 million addition to endowment principal that can be attributed to the Bucks for Brains initiative. Over that same time period, the market value of research university endowments increased from $447.4 million to $1.465 billion, or by about $1.02 billion. This means that about half (48.3 percent) of the total increase in endowment assets for the period can be attributed to additions to endowment principal generated by the Bucks for Brains initiative. Sources of increase in market value include cash gifts received during the year, pledge payments, increased value of investment holdings, and unexpended investment earnings added to the corpus. This analysis includes only the first two components.

<u>Analysis of Increases in Endowed Chairs and Professorships</u>

Another short-term goal of the Bucks for Brains program was to increase the number of endowed chairs and endowed professorships at the public universities in areas of strategic benefit to the Commonwealth. In 1997, the University of Kentucky and the University of Louisville lagged behind their respective peer institutions in terms of the number of endowed chairs and professorships established. The added salary and staff support provided by endowment proceeds at other research universities placed UK and UofL at a competitive disadvantage when recruiting intellectual talent. One of the primary goals of the Bucks for Brains initiative was to level the playing field and place UK and UofL on equal footing in terms of their ability to recruit top researchers to Kentucky.

This analysis examines three research questions related to the goal of increasing the number of endowed chairs and professorships:

1. Has the number of **endowed chairs and professorships** at Kentucky public universities increased over the 10-year period since implementation of the Bucks for Brains program?

2. Has the growth in endowed chair and professorship positions at Kentucky public universities occurred in **disciplines of strategic benefit** to the Commonwealth?

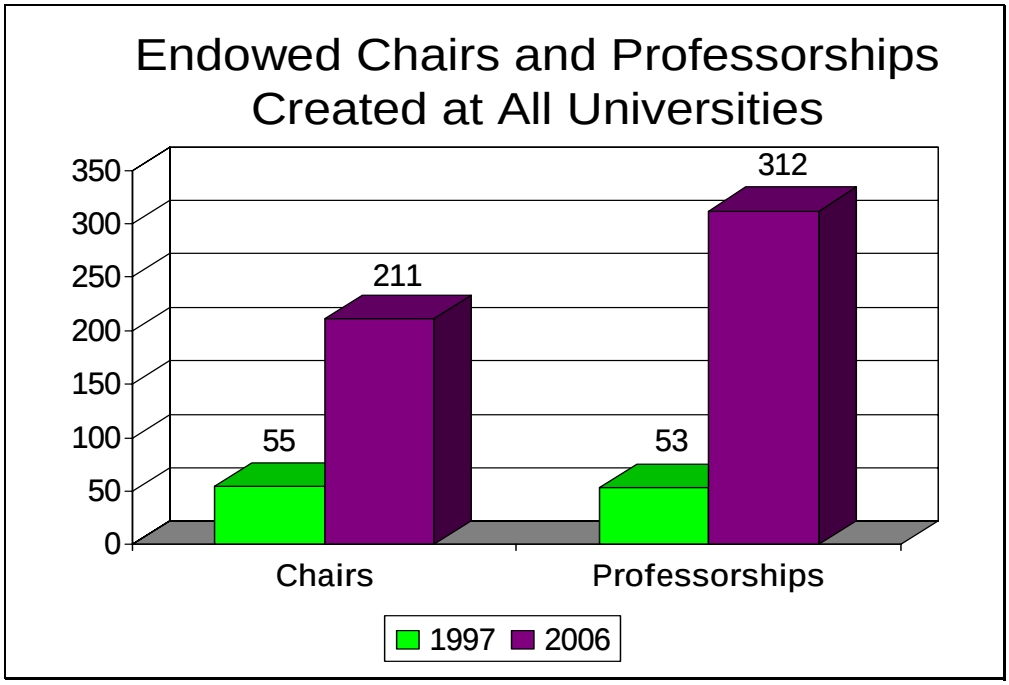
3. To what extent did the **Bucks for Brains** program **contribute** to the growth in endowed chairs and professorships at Kentucky public universities?

The primary source of data used to answer these questions is the Endowment Match Program Annual Summary Report submitted October 15 each year to the Council.

1. <u>Number of endowed chairs and professorships</u> – The number of endowed chairs and professorships at Kentucky public universities increased markedly in the decade following implementation of the Bucks for Brains initiative. Between 1997 and 2006, the number of endowed chairs at all universities increased from 55 to 211, or by 284 percent, and the number of endowed professorships increased from 53 to 312, or by 489 percent. These data are presented visually in Graph 8. This level of growth in intellectual talent would not have been possible without the Bucks for Brains initiative.

The University of Kentucky experienced the largest increase in endowed chairs for the period both in terms of number (+76) and percentage (+362 percent). Eastern Kentucky University recorded the largest number increase (+4) among the comprehensive universities, while Murray State University posted the largest percentage increase (+100 percent). UK recorded the largest number increase in endowed professorships (+192) and Western Kentucky University produced the largest percentage increase (+2,800 percent).

Graph 8



*Currently funded, but not all appointed.

2. <u>Disciplines of strategic benefit</u> – When the Governor and General Assembly created the Bucks for Brains program, they delegated to CPE responsibility for determining areas of concentration where program funds would be used. For each round of funding for the program, the Council promulgated and approved a set of guidelines that identified priority areas of strategic benefit to the Commonwealth. The most recent version of program guidelines, last revised July 19, 2004, specifies that at least 70 percent of program funds at the research universities must be endowed for the purpose of supporting Research Challenge Programs or academic disciplines contained within five new economy areas:

- Human Health and Development
- Biosciences
- Materials Science and Advanced Manufacturing
- Information Technologies and Communications
- Environmental and Energy Technologies

A similar requirement is contained in the guidelines for the comprehensive universities. At least 50 percent of program funds at the comprehensive universities must be used to support Programs of Distinction or disciplines contained within the five new economy areas listed above. These clusters define important areas of opportunity for economic growth in Kentucky, which could become magnets for both talent and capital.

The public universities have utilized program funds in prescribed disciplines of strategic benefit to the Commonwealth. At the research universities, about 80 percent of dispersed 2002-04 program funds were endowed in CPE priority disciplines (EMP Annual Summary Report data). Specifically, as of June 30, 2006, UK and UofL combined had endowed about 58 percent of program funds in Human Health disciplines, 13 percent in Biosciences, 5 percent in Research Challenge program disciplines, and 4 percent in other new economy areas. At the comprehensive universities, about 50 percent of program funds were endowed in CPE priority areas, including 25 percent in Human Health disciplines, 15 percent in Programs of Distinction, and 10 percent in other targeted economic development areas. These proportions meet guideline requirements for the program.

3. <u>Bucks for Brains Contribution</u> – The Bucks for Brains program has been the primary catalyst for stimulating growth in endowed chairs at Kentucky public universities over the past decade. Between 1997 and 2006, the number of endowed chairs at participating universities increased from 55 to 211, respectively, or by 156 positions. According to the FD-21 Report data, 100 percent of that increase can be attributed to positions created using state funds accessed and private funds leveraged through the Bucks for Brains program. As of June 30, 2006, about three-fourths of all endowed chairs at the research universities, and over 90 percent of endowed chairs at the comprehensive universities were established using match program funds.

The program has been a major contributor to the increase in endowed professorships, as well. Between 1997 and 2006, the number of endowed professorships at participating universities increased from 53 to 312, or by 259 positions. About 88 percent of that increase can be attributed to the Bucks for Brains program (FD-21 Report data). As of fiscal year-end 2006, more than 70 percent of all endowed professorships at the research universities and over 80 percent of endowed professorships at the comprehensive universities were established using match program funds.

Analysis of Federal Research Expenditures

This analysis investigates four research questions pertaining to federal R&D expenditures generated by university faculty:

1. Has the **amount of federal R&D expenditures** generated by faculty at Kentucky public universities increased over the 10-year period since implementation of the Bucks for Brains program?

2. To what extent have Kentucky research universities moved up in **rankings of** federal R&D expenditures among **public universities** nationwide?

3. How does the amount of federal R&D expenditures generated by faculty at Kentucky public universities **compare** to the amount generated by faculty at **benchmark** institutions?

4. To what extent did the **Bucks for Brains** program **contribute** to the growth in federal R&D expenditures at Kentucky public universities?

The primary source of federal R&D expenditure data used in this report is the National Science Foundation (NSF) Survey of R&D Expenditures at Universities and Colleges. The NSF survey is widely recognized as a comprehensive source of information on separately budgeted research and development expenditures within academia in the United States. It is administered on an annual basis and components for major data elements are available starting in 1972. Additional sources include Center for Measuring University Performance rankings data (public university rankings and benchmark comparisons) and FD-21 Report data (preliminary 2006 estimates).

1. Amount of federal R&D expenditures – The amount of federal R&D expenditures generated by faculty at Kentucky research universities has increased dramatically since implementation of the Bucks for Brains program. Between 1997 and 2005, federal R&D expenditures at the research universities increased from $75.6 million to $209.9 million, or by 177 percent (Table 5). The University of Kentucky experienced the largest dollar increase among the research universities (+$80.6 million), and the University of Louisville recorded the largest percentage increase

(+396 percent). Preliminary estimates indicate that the growth trend continued in 2006, with UK reporting $151.2 million in federal expenditures and UofL reporting $70.5 million (FD-21 Report data).

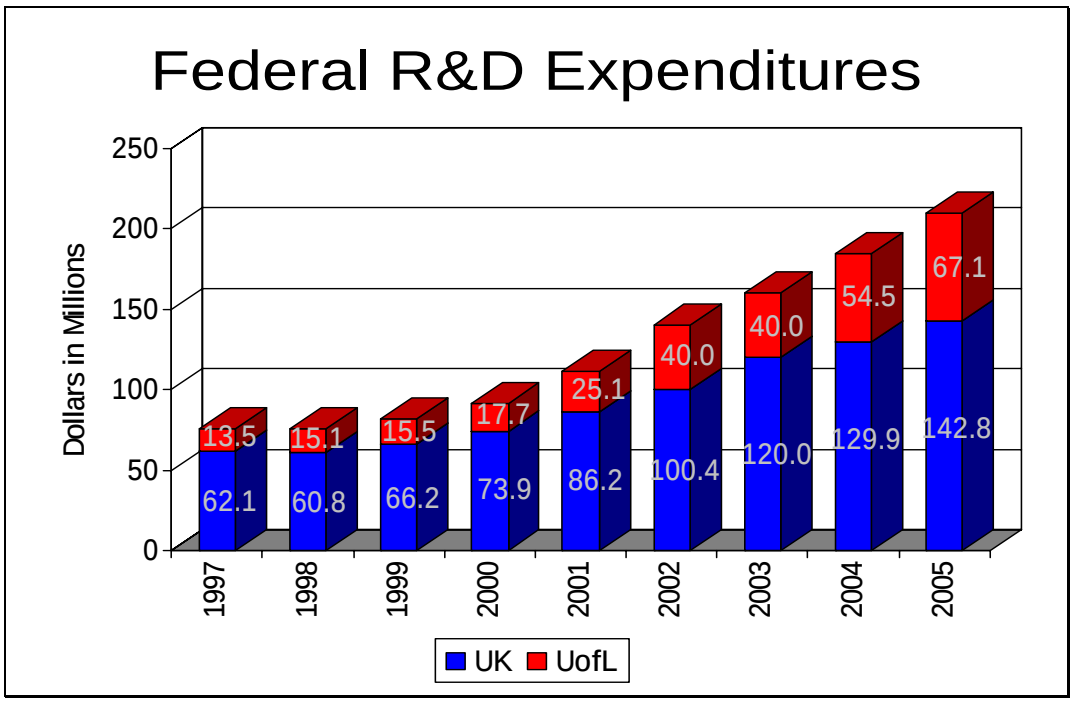
Table 5
Change in Federal R&D Expenditures at Kentucky Public Universities
Between Fiscal Years 1997 and 2005 (dollars in thousands)

Sector / Institution	Federal R&D 1997	Federal R&D 2005	Dollar Change	Percent Change
Research Institutions				
University of Kentucky	$62,128	$142,794	$80,666	130%
University of Louisville	13,521	67,104	53,583	396%
Subtotal	$75,649	$209,898	$134,249	177%
Comprehensive Institutions				
Eastern Kentucky University	NA	$294	NA	NA
Kentucky State University	$2,139	3,044	$905	42%
Morehead State University	451	1,693	1,242	275%
Murray State University	422	1,310	888	210%
Northern Kentucky University	132	768	636	482%
Western Kentucky University	2,606	4,915	2,309	89%
Subtotal	$5,750	$12,024	$5,980	109%
Total	$81,399	$221,922	$140,229	173%

Source: National Science Foundation

These data are presented visually in Graph 9. As can be seen in the graph, there is a consistently upward trend in federal R&D expenditures at the research universities every year since 1998. As will be demonstrated elsewhere in the report, this growth trend would not have been possible without the Bucks for Brains program.

Graph 9



The comprehensive universities also experienced a marked increase in the amount of federal R&D expenditures generated by their faculty. Between 1997 and 2005, federal expenditures at the comprehensives increased from $5.8 million to $12.0 million, or by 109 percent (Table 5). Western Kentucky University recorded the largest dollar increase for the period (+$2.3 million), and Northern Kentucky University recorded the largest percentage increase (+482 percent). Preliminary estimates for 2006 show continued growth in federal expenditures at two institutions. Eastern Kentucky University reported $3.8 million in federal expenditures in 2006 and Western Kentucky University reported $7.3 million (FD-21 Report data).

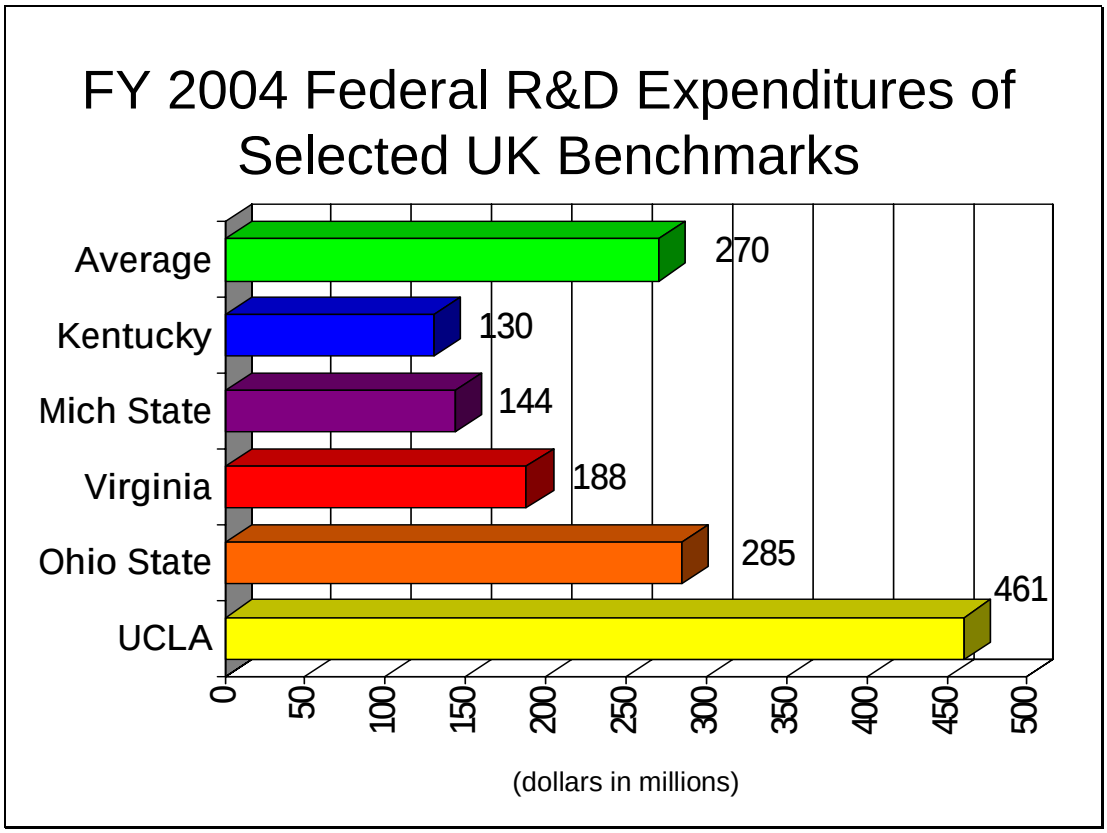
2. <u>Public University Rankings</u> – The University of Kentucky experienced a modest climb in public university rankings of federal R&D expenditures in the years following Bucks for Brains program implementation. Between 1997 and 2004, the amount of federal R&D expenditures generated by UK faculty grew from $62.1 million to $129.9 million and the university moved up in rank from 45th to 40th (Center for Measuring University Performance data). This ascension shows that UK is progressing toward its HB 1 goal, but still a gap remains. In 2004, the University of Florida generated $221.9 million in federal R&D expenditures and ranked 20th among public universities nationwide. This means that the gap between the 20th ranked institution and UK in 2004 was $92.0 million.

During this same period, the University of Louisville recorded a marked increase in public university rankings of federal R&D expenditures. In 1997, UofL faculty

generated $13.5 million in federal expenditures and the university ranked 119th among public universities nationwide (Center for Measuring University Performance data). Seven years later, in 2004, the university generated $54.5 million in federal expenditures and ranked 87th. Despite this impressive climb, UofL still lags behind other metropolitan universities in terms of generating federal research dollars. For example, federal expenditures at the University of Pittsburgh in 2004 were $394.4 million, which ranked the university 7th among public institutions. That same year, the University of Cincinnati generated $195.0 million in federal expenditures and ranked 26th. The gap between UofL and these universities is $339.9 million and $140.5 million, respectively.

3. <u>Benchmark Comparisons</u> – The University of Kentucky compares very favorably to its benchmark institutions in terms of percentage increase in federal R&D expenditures. Between 1997 and 2004, federal research expenditures at UK grew by 109 percent. This increase was the fifth highest percentage gain among its benchmark institutions. Only the University of Florida (+135 percent), Ohio State University – Columbus (+132 percent), the University of Virginia (+128 percent), and the University of California – Los Angeles (+114 percent) recorded a higher percentage increase in federal expenditures for the period.

Graph 10

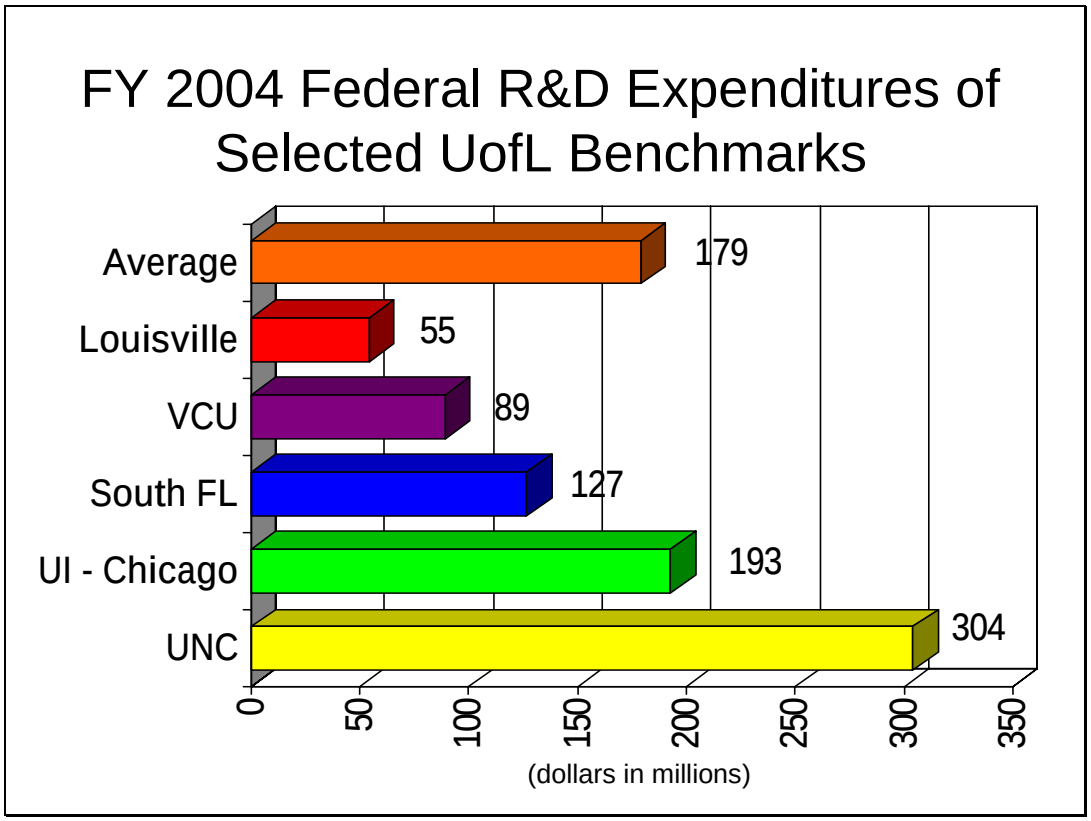


Despite the relatively large percentage increase, UK did not gain much ground in dollar terms relative to its benchmarks. In 1997, the University of Kentucky recorded the second lowest dollar amount of federal R&D expenditures ($62.1 million) of any of its benchmarks. Only the University of Georgia generated a lesser amount of federal expenditures ($54.4 million) that year than UK. Seven years later, in 2004, university faculty generated $129.9 million in federal R&D expenditures and the university moved up one spot among its benchmarks. The University of Georgia remained at the bottom ($96.3 million), and UK passed NC State University ($103.6 million) to post the third lowest level of expenditures among its benchmarks.

In the seven years following Bucks for Brains program implementation, the University of Louisville posted one of the highest proportionate gains in federal R&D expenditures of any public university in the nation. Between 1997 and 2004, federal research expenditures at UofL increased by 303 percent. Only five public universities (among those with federal expenditures that exceeded $20 million in 2004) recorded a larger percentage increase in federal expenditures for the period than did UofL. Given the magnitude of this increase, it is not surprising that the University of Louisville was among the leaders in federal expenditure growth compared to its benchmark institutions. The university's 303 percent increase represents the second highest proportionate increase among its benchmark institutions. Only the University of South Florida posted a larger gain for the period (+308 percent).

While this proportionate gain shows tremendous progress, the university continues to rank near the bottom in dollar terms relative to its benchmarks. In 1997, UofL faculty generated $13.5 million in federal R&D expenditures and the university was positioned at the bottom compared to its benchmark peers. In 2004, university faculty produced $54.5 million in federal expenditures and UofL moved up one spot (to second from the bottom) compared to its benchmarks. Only Temple University received a lesser amount of federal expenditures in 2004 than did UofL. This reiterates a familiar storyline throughout this report. Kentucky universities are progressing toward their HB 1 goals, but benchmark competitors are not standing still.

Graph 11



4. <u>Bucks for Brains Contribution</u> – In preceding paragraphs, it was demonstrated that federal R&D expenditures at Kentucky public universities have increased over the past decade. But to what extent did the Bucks for Brains initiative contribute to that growth? In this analysis, the proportion of university federal R&D expenditures generated by Bucks for Brains faculty is used to estimate the program's contribution to expenditure growth. Specifically, the cumulative amount of federal expenditures generated by B4B faculty between 2003 and 2006 (FD-21 Report data are available beginning in 2003) is divided by federal expenditures generated for the university.

The Bucks for Brains initiative has contributed to the growth in federal R&D expenditures at Kentucky public universities. Between 2003 and 2006, the state's public research universities generated a cumulative total of $775.9 million in federal R&D expenditures. Of that total, $136.6 million, or 18 percent, was generated by Bucks for Brains faculty. Proportionately, program faculty at the University of Louisville generated a larger percentage of the university's federal expenditures than did program faculty at the University of Kentucky. Over the three-year period, B4B faculty at UofL generated a cumulative total of $57.8 million in federal expenditures, or about 25 percent of the $232.0 million university total. At UK, program faculty

generated $78.8 million in federal expenditures, or about 15 percent of the $543.9 million university total.

Analysis of Extramural Research Expenditures

As previously mentioned, HB 1 established aggressive 2020 goals for the University of Kentucky (i.e., top 20 public university) and the University of Louisville (i.e., premier, metropolitan research university). Recognizing the importance of ambitious research agendas for achieving these goals, the Kentucky Department of Commercialization and Innovation, the Council on Postsecondary Education, and UK and UofL officials developed a goal of reaching $500 million in extramural academic R&D expenditures by the year 2010. Extramural R&D expenditures include all sources of research awards that originate outside the university (i.e., federal, state, local, industry, and other).

This analysis examines two research questions related to the goal of increasing extramural R&D expenditures generated by university faculty:

1. Has the annual **amount of extramural R&D expenditures** generated by faculty at Kentucky public universities increased over the 10-year period since implementation of the Bucks for Brains program?

2. To what extent did the **Bucks for Brains** program contribute to the growth in extramural R&D **expenditures** at Kentucky research universities?

The main source of extramural expenditure data used in this report is the NSF Survey of R&D Expenditures at Universities and Colleges. In addition, the CPE Endowment Match Program Outcome Measures Report (or FD-21 Report) is used to provide preliminary 2006 estimates of extramural expenditures at Kentucky public universities and to calculate the contribution of Bucks for Brains faculty to extramural expenditure growth.

1. Amount of Extramural R&D Expenditures – The annual amount of extramural R&D expenditures generated by Kentucky research university faculty has increased during the past decade. Between 1997 and 2005, extramural R&D expenditures generated by research university faculty increased from $105.2 million to $309.7 million, or by 194 percent (Table 6). The University of Kentucky recorded the largest dollar increase for the period (+$132.8 million), while the University of Louisville recorded the largest percentage increase (+318 percent). The upward trend continued in 2006, with UK reporting $226.1 million in extramural expenditures, and UofL reporting $101.3 million (FD-21 Report data). Combined extramural R&D expenditures at the research universities grew to $327.4 million in 2006, representing a 211 percent increase since 1997. These data are presented visually in Graph 12. As can be seen in the graph, there has been a consistently upward trend in extramural research and development expenditures at the research universities since 1997.

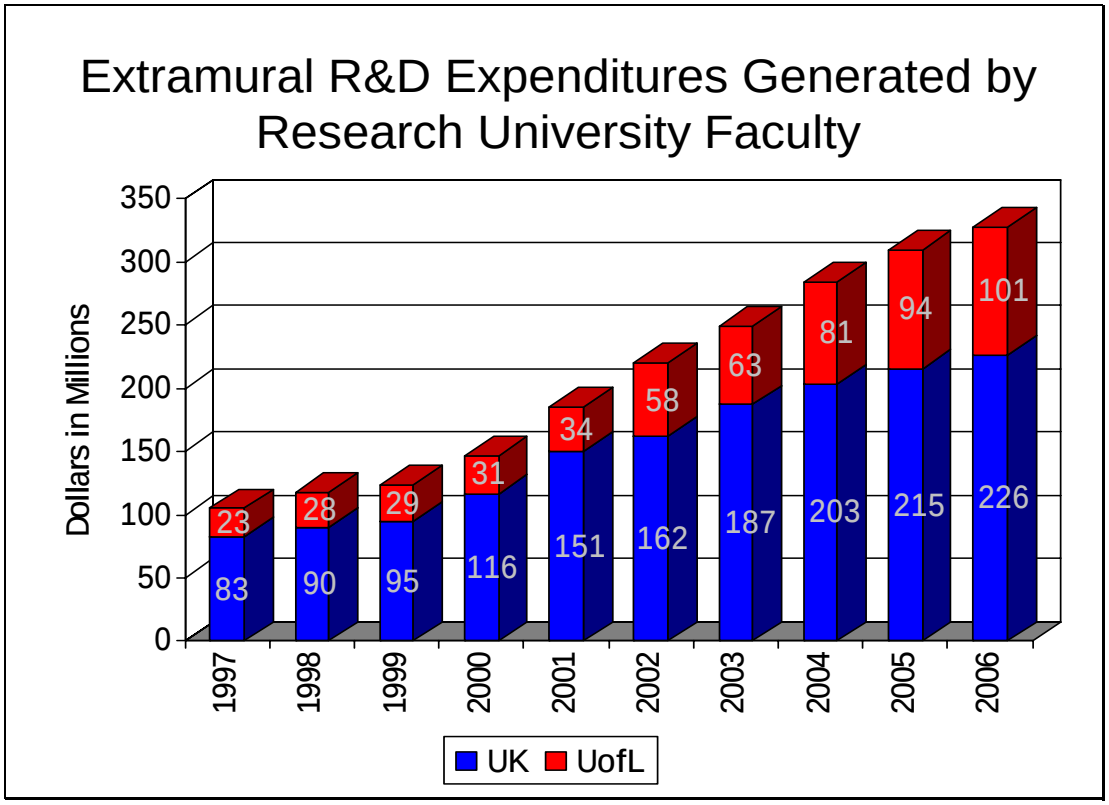
Table 6
Change in Extramural R&D Expenditures
Between 1997 and 2005

Research Universities (dollars in thousands)

Funding Source	Extramural R&D 1997	Extramural R&D 2005	Dollar Change	Percent Change
Federal	$75,649	$209,898	$134,249	177%
State & Local	7,446	50,509	43,063	578%
Industry	14,781	10,643	(4,138)	-28%
Institutional	53,070	125,294	72,224	136%
Other	7,292	38,656	31,364	430%
Total	$158,238	$435,000	$276,762	175%
Minus: Institutional	53,070	125,294	72,224	136%
Extramural	$105,168	$309,706	$204,538	194%

Source: National Science Foundation

Graph 12



The state's comprehensive universities also experienced growth in extramural R&D expenditures. Between 2000 and 2005 (consistent, reliable data are not available prior to 2000), extramural expenditures at the comprehensive universities increased from $7.7 million to $14.7 million, or by 91 percent (Table 7). Western Kentucky University recorded the largest dollar increase for the period (+$2.8 million), and Northern Kentucky University recorded the largest percentage increase (+1,591 percent). Preliminary estimates for 2006 show continued growth in extramural expenditures at Murray State University, which reported $2.1 million in expenditures in 2006 (FD-21 Report data).

Table 7
Change in Extramural R&D Expenditures
Between 2000 and 2005

Comprehensive Universities (dollars in thousands)

Funding Source	Extramural R&D 2000	Extramural R&D 2005	Dollar Change	Percent Change
Federal	$6,500	$12,024	$5,524	85%
State & Local	1,009	1,942	933	92%
Industry	187	619	432	231%
Institutional	1,837	2,549	712	39%
Other	13	131	118	908%
Total	$9,546	$17,265	$7,719	81%
Minus: Institutional	1,837	2,549	712	39%
Extramural	$7,709	$14,716	$7,007	91%

Source: National Science Foundation

2. <u>Bucks for Brains Contribution</u> – The Bucks for Brains program has contributed to growth in extramural R&D expenditures at Kentucky research universities. Between 2003 and 2006, research university faculty generated a cumulative total of $1.173 billion in extramural expenditures. Of that total, $145.7 million, or about 12 percent, was produced by Bucks for Brains faculty members (FD-21 Report data). As was the case with federal expenditures, program faculty at UofL generated a larger share of university total extramural expenditures, than did program faculty at UK. At UofL, B4B faculty produced $75.1 million in extramural expenditures over the four-year period, or about 22 percent of the cumulative $338.8 million university total. Program faculty at UK generated $70.6 million in extramural expenditures, or about 9 percent of the cumulative $834.3 million university total. This

variance has more to do with differences in respective size of the professoriate at each institution than it does with differences in B4B faculty productivity.

Featured Anecdotal Institutional Profiles

> "I recall spending an evening with some of the Bucks for Brains professors. It was an exhilarating experience to talk with such bright folks who were so happy to be in Kentucky and who thought that Kentucky had a great opportunity to make some real contributions through research. Several of the medical professors talked about their hope of finding cures for diabetes and cancer and other devastating illnesses that are so prevalent in Kentucky."
>
> *Speaker of the House, Jody Richards, Kentucky General Assembly*

The following anecdotal profiles provide a small sample of the many successful enterprises that have been generated as a result of the Bucks for Brains program. More comprehensive institutional reports for each of the public universities may be reviewed by accessing the online version of this report on the Council on Postsecondary Education Web site at http://cpe.ky.gov.

University of Kentucky Bucks for Brains Profiles

The University of Kentucky has been allocated a total of $200 million in state funds through the three rounds of funding of the Bucks for Brains initiative. The university has been able to generate equal amounts of private funding to meet the match requirements of the B4B program.

> "Bucks for Brains has made a substantial difference in the quality of the University of Kentucky. Its impact can be measured in the quality of our faculty, the breadth of our research enterprise, and the strength of our endowment. The impact also can be measured in the culture of the university community. There were plenty of skeptics on our campus in 1997 who believed the top 20 mandate was merely hollow rhetoric. But over the last 10 years, we have established hundreds of new chairs and professorships and used them to recruit and retain researchers who, in previous years, would not have considered a career at the University of Kentucky. Now, we are a magnet that attracts the kind of serious scholarship necessary to establish a world-class university. And with those efforts, we have cultivated a university community confident in our prospects for achieving the aggressive target of top 20 status."
>
> *Dr. Lee T. Todd, Jr., President, University of Kentucky*

Some examples of current University of Kentucky Bucks for Brains program include the following:

Future Treatments for Spinal Cord Injury

The University of Kentucky's Spinal Cord and Brain Injury Research Center (SCoBIRC) is focused on effective treatments for the estimated 11,000 Americans who suffer a spinal cord injury each year and the 1.5 million who sustain traumatic brain injuries. After traumatic injury to a person's brain or spinal cord, time is the major factor in the ultimate severity of that injury. Much of the damage to the injured nervous tissue occurs during the first several hours and days following the incident, which suggests that "secondary injury" might be prevented by early treatment with neuroprotective drugs.

Edward Hall, an endowed chair and director of the UK Spinal Cord & Brain Injury Research Center, is leading a team of scientists who are testing various drugs that might inhibit secondary injury to the brain or spinal cord. The team includes Jim Geddes, Patrick Sullivan, Kathryn Saatman, and Alexander Rabchevsky (SCoBIRC), Stephen Scheff (Sanders-Brown Center on Aging), and Joe Springer (physical medicine and rehabilitation).

Hall was a pioneer in the discovery and development of the steroid drug methylprednisolone, the only approved drug that has been shown to be effective for the treatment of spinal cord injury. He is hopeful that the protective effects of the newer drugs being tested by his group will far surpass the benefits of methylprednisolone.

New Treatments for Nicotine and Methamphetamine Abuse

Dr. Linda Dwoskin, a professor of pharmaceutical sciences and U. S. Surgical-Pfizer Endowed Professor at UK, is currently involved in two related projects one focused on nicotine and the other on methamphetamine. She is teaming up with UK colleagues Peter Crooks, George A. Digenis Professorship/Chair in Drug Design and Discovery at the UK School of Pharmacy, and Dr. Michael Bardo, UK Department of Psychology.

The research team is trying to find small molecules that block receptors and transporter proteins responsible for the "reward" associated with nicotine and methamphetamine use. These molecules might serve as novel therapeutic agents to help those who are addicted to drugs.

The nicotine study is partially supported by a $6 million grant from The National Institutes of Health (NIH) and is the largest single award ever received by the College of Pharmacy. In the methamphetamine project, research is focused on lobeline which, when fed to rats, stops the craving for methamphetamines. In 2002, Crooks and

Dwoskin began working with investors to form a spin-off company, Yaupon Therapeutics Inc., to further develop and market lobeline.

University of Louisville Bucks for Brains Profiles

> "The consequences and impact of the Bucks for Brains program have been far-reaching… Economic development is advanced at the University of Louisville through enhanced pure research dollars, the multiplier effect of related research investment, and the commercialization of translational research. Most importantly the quality of life for Kentuckians is improved when citizens are able to be treated locally for diseases such as Parkinson's."
>
> *Dr. James Ramsey, President, University of Louisville*

During the three rounds of B4B funding, the University of Louisville has been allocated a total of $1 million of state funding to be matched by private funding through the Endowment Match (or Bucks for Brains) program. This state funding has been instrumental in increasing UofL's endowment, enhancing funded research, and attracting world class researchers to the university. Such growth is a key factor in the university's legislatively mandated goal of becoming a premier metropolitan research university.

Some examples of currently funded Bucks for Brains program at the University of Louisville include the following:

Charles A. Grosscurth Biomechanics Chair in Bioengineering – J. B. Speed School of Engineering

<u>Research in Biomechanical Engineering</u>

Gina Bertocci, Ph.D., is Associate Professor of Mechanical Engineering and Pediatrics and Director of the Injury Risk Assessment and Prevention Laboratory at UofL. She studies the biomechanics of injury and rehabilitation and focuses primarily on child abuse and wheelchair transportation safety.

In the child abuse area, her research team is at work using engineering techniques and medical principles to delineate between abusive and accidental injuries. Bertocci's wheelchair transportation safety research utilizes computer simulation and testing to understand the loads that a wheelchair is exposed to in a crash and the level of injury risk that someone seated in a wheelchair might experience. This work will allow manufacturers to design safer wheelchairs that protect occupants during a crash.

Jewish Hospital Heart and Lung Institute – Distinguished Chair of Cardiology

Treating Cardiovascular Disease

Roberto Bolli, M.D., is Director of the Division of Cardiology and UofL's Institute for Molecular Cardiology. His research focuses on preventing the damage caused during heart attacks by studying ischemic preconditioning, the phenomenon in which heart muscle exposed to brief periods of stress becomes resistant to the tissue death that might be caused by a heart attack.

In 2005, Bolli led a UofL team that was awarded an $11.7 million grant from the National Institutes of Health to continue to build upon this research. Since his arrival at U of L in 1994, Bolli has brought over $50 million in NIH grants to the university. Dr. Bolli is now working to determine whether gene therapy or other strategies that increase myocardial nitric oxide and carbon monoxide levels result in long-term protection against heart failure.

Eastern Kentucky University Bucks for Brains Profile

Long known as the School of Opportunity, Eastern takes seriously its mission to broaden educational access for talented, promising students who need financial assistance to open the doors of academe. The Bucks for Brains program has provided significant assistance in EKU's quest to expand its mission and further enrich the lives of those it serves. Amidst the first capital campaign in Eastern's history, the Bucks for Brains two-for-one funding premise caught the attention of potential donors; 2,566 EKU alumni and friends made first-time gifts to the university.

One example of a B4B program at EKU is the following:

Research & Enhanced Teaching

The *Hazel Wilson Memorial Endowed Chair in Human Environmental Sciences* was made possible through a donation of $500,000 from 1934 EKU alumnus Vernon Wilson in memory of his wife of 50 years. The Bucks for Brains program matched those funds dollar for dollar.

> "Eastern gave us a chance. I was from a very poor county, but higher education was my ticket to success."
>
> *Vernon Wilson*

Dr. Jacqueline Jensen is the first Hazel Wilson Endowed Chair. The endowment enables her to conduct research in middle school, high school, and college classrooms. Although her primary goal is to enhance teaching across the state, Dr. Jensen has studied and published articles about professionalism and professional ethics, the application of constructivist learning theories, and the recruitment of students into Family and Consumer Sciences Education. Dr. Jensen is a Fellow of the

Kappa Omicron Nu Leadership Academy and is currently at work on a book that documents student reasoning of ethical dilemmas.

Western Kentucky University Bucks for Brains Profile

> "Endowments are the way of ensuring that the university will continue in perpetuity. Endowments for professorships allow us to attract and retain quality faculty who will continue to enhance already strong programs. WKU currently has 27 endowed faculty positions."
>
> *Dr. Gary Ransdell – President of Western Kentucky University*

One example of WKU's B4B endowed professorships is the following:

Physics Research and Outreach
Dr. Charles McGruder serves as the *William McCormack Professor in Physics,* a named professorship created through the Regional University Excellence Trust Fund that matched donated funds from Dr. William McCormack, a 1957 graduate of Western Kentucky University. Serving as the *William McCormack Professor in Physics*, Dr. McGruder receives a reduced teaching load that enables him to conduct research, travel in pursuit of his research, and participate in nationwide academic and community service.

Dr. McGruder participates in three major national initiatives:

- WKU's project to develop a worldwide network of robotically operated small telescopes.
- A National Aeronautics and Space Administration (NASA) grant to work with historically black colleges to encourage students of color to pursue doctoral degrees in the sciences.
- Consult with NASA to organize an annual conference aimed at engaging minority students in science research.

Morehead State University Bucks for Brains Profile:

Morehead State University has utilized the Regional University Excellence Trust Fund to create specific endowments within colleges, to establish new scholarships, to dramatically expand fundraising priorities, to emphasize scholarship/research, to promote diversity, and to fund new academic programs and P-16 partnerships.

One example of an innovative B4B program at Morehead is the following:

W. Paul and Lucille Caudill Little Endowed Chair

Theater in the Schools Program
With a gift from the W. Paul and Lucille Caudill Little Foundation matched through the Regional University Excellence Trust Fund, an endowed chair was established to create a unique "Theater in the Schools" program.

Dr. Robert Willenbrink, professor of theater and Chair of the Department of Communication and Theater at Morehead State University, was selected as the endowed chair to oversee the development of a traveling performance troupe appropriately named, *The Little Company*. The mission of the troupe is to annually produce plays and educational materials that tour the elementary, middle, and secondary schools throughout the region and the state. Educational enhancement materials include study guides that incorporate lesson plans, glossaries, and theater activities.

The Little Company promotes academic excellence and provides unique artistic opportunities for performers and audiences alike while exposing students, many for the first time, to the magic of live theater. The program continues to expand as the following chart illustrates.

Year	Participating Schools	Number of Performances/Workshops	Participating Students
2005	44	47	9,650
2006	56	59	10,650
2007	98	96	26,000

Murray State University Bucks for Brains Profile

The Regional University Excellence Trust Fund has had various positive impacts on Murray State's academic programs and on the surrounding community and region. The program has made possible the creation of two endowed chairs, four professorships, 21 endowed scholarships, and three mission support endowments.

One example of a B4B program at Murray State University is the following:

Financial Planning Programs and Certification
The *Arthur J. Bauernfeind Endowed Chair in Investment Management* was the first endowed chair established at Murray State University as a result of the Bucks for Brains program. Dr. David Durr, who currently holds the chair, has a PhD in Finance

from the University of North Texas. The *Bauernfeind Endowed Chair* has resulted in the creation of a significant new academic program, the financial planning concentration, within the Department of Finance and Economics. Dr. Durr registered the new program with the Certified Financial Planner (CFP) Board of Standards, an independent certifying organization. The CFP Board awards designated certification for individuals who meet its education, examination, experience, and ethics requirements.

In an effort to create sustained cooperative relationships with financial services companies, Dr. Durr works to enhance regional recognition for the Murray State financial planning program through speaking engagements, seminars, and meetings. Recently Dr. Durr developed a student internship program in partnership with Security Benefit, a nationally recognized leader in financial services. This program provides undergraduate and graduate students with relevant hands-on work experience relevant to their academic and career goals.

Northern Kentucky University Bucks for Brains Profile

The Bucks for Brains program has transformed Northern Kentucky University by enabling the institution to further advance core values, broaden access to higher education, strengthen undergraduate research, develop entrepreneurial workforce skills, enhance scholarly excellence in selected areas, and encourage community engagement.

One example of the successful investment of B4B funding at NKU is the following:

Strengthening Undergraduate Research

The Bucks for Brains program has played a pivotal role in elevating NKU's *Center for Integrative Natural Science and Mathematics (CINSAM)* to new heights. The mission of CINSAM is to enhance the teaching, learning, and applied science and mathematics at NKU and surrounding K-12 schools. Additionally, the new Dorothy Westerman Herrmann Science Center has secured B4B endowed funds to ensure that state-of-the-art lab and teaching equipment will remain current. Faculty and students have benefited from endowment gifts such as that awarded by the Rieveschl Foundation to purchase science instrumentation for the Center.

The research activity of students in CINSAM-related departments has more than tripled over the past seven years. Students regularly present their research findings at local, state, and national meetings, and several have published their findings in scholarly professional journals. B4B endowment gifts have also created several endowed professorships and programs in the sciences at NKU including *The Ashland Inc. Professor of Integrative Science* held by Dr. Hazel Barton and the *Drs. Evan and Lindsay Stein Professor of Bio-computing* held by Kevin Kirby.

Kentucky State University Bucks for Brains Profile

Kentucky State University experienced its most successful fund-raising campaign by utilizing the matching opportunities provided by the Regional University Excellence Trust Fund. Donors enthusiastically responded and the university exceeded its matching requirements by over $225,000. Funds generated from the Bucks for Brains program support KSU's mission to prepare a diverse student population to compete in a global society.

Successful Fundraising Campaign

Kentucky State University has utilized Bucks for Brains funding to complete a highly successful fund-raising campaign entitled "Kentucky's Vision 2020 Endowment Match Campaign." The campaign resulted in the creation of three endowed professorships in business, math/science, and education, an endowed library fund, and endowed student scholarships. The creation of the three endowed professorships has been complemented by the development of unique academic programs and the construction of a new genetics laboratory.

The Future

> "The Bucks for Brains program is a significant part of Kentucky's larger effort to create systemic reform of higher education. Fundamental to the reform effort was the desire to jump start state level university research to facilitate economic development and create new economy jobs for Kentuckians."
>
> *President Gary Cox*
> *Association of Independent Kentucky Colleges and Universities*

The Bucks for Brains program was designed as an important transformative feature of Kentucky's 1997 postsecondary education reform initiative. The overarching goal of the B4B program was to attract and retain world class faculty to engage in cutting edge research within the state. By stimulating the quality and quantity of Kentucky-based research and by attracting significant increases in external funds, the Commonwealth hoped to enhance its capacity to commercialize that research and eventually create new companies. The state's universities would serve as incubators for economic innovation and growth.

This report outlines the many tangible successes of the Bucks for Brains initiative and demonstrates the future challenges Kentucky faces in realizing the HB 1 goals of national prominence and ranking for UK and UofL. Both research institutions and the comprehensive public universities are to be commended for their respective and formidable efforts to rise successfully to the challenges inherent in the implementation of the Bucks for Brains program.

As Kentucky's postsecondary education institutions strive to appropriately prepare students to compete and to excel in the twenty-first century, it must be remembered that other states and other countries are also investing in the future. In order to remain competitive in the future, Kentucky must continue to invest in educational opportunity for all citizens. Additionally, Kentucky must continue to invest in the creation of superior academic institutions that are nationally recognized for research and graduate programs.

> "Kentucky can be competitive in the new economy, but only if it has the intellectual and research infrastructure to support such an economy…The enhancement of Kentucky's research and graduate programs will make the state competitive in the new economy and propel Kentucky corporations and businesses to a new echelon among competitors. A first-class research university will be a magnet for economic development and should be a goal of postsecondary reform efforts."
>
> *Postsecondary Education in Kentucky: An Assessment – March 1997*

Summary and Conclusions

Kentucky's innovative $350 million investment in the Bucks for Brains initiative has yielded significant positive results particularly with respect to the shorter term goals established for the program.

- Private donations to public universities have increased dramatically both in terms of the total dollar amounts generated and the number of first-time donors to each of the institutions.
- Public university endowments have grown substantially due to state and private matched contributions.
- Endowed chairs and professorships have increased significantly.
- Intellectual capital has been enhanced at public higher education institutions through the addition of world class faculty who have been recruited through the Bucks for Brains program.
- Notable increases in externally funded research have occurred through the Bucks for Brains program.
- Significant patent applications, licensing, and options activities have been generated by the recently appointed Bucks for Brains endowed faculty.
- In 2006 Bucks for Brains faculty created more than one third of university-generated start-up companies.

In order to sustain the impact of these very positive short and long term trends and to realize the intended goals of HB 1, additional future funding of the Bucks for Brains program appears to be warranted. Indeed, without the Bucks for Brains program, Kentucky's specific HB 1 goals to have a top 20 comprehensive research university and a premier, nationally recognized metropolitan research university would be virtually unattainable.

As the data analyzed within this report demonstrates, even with the significant and notable financial impact of the B4B program on fundraising, endowment size, and federal and external research, UK and UofL continue to trail behind many of their comparable benchmark institutions. The HB 1 goals particularly for UK and UofL warrant sustained and significant public and private financial investment in research, intellectual talent, endowment growth, facilities, and academic quality.

Summary Cumulative Data Chart

Bucks for Brains Program Indicators of Progress

Combined UK & UofL Data

Indicator	1997	2000	2003	2004	2005	2006
Annual Giving	$87.7	$92.5	$87.6	$97.1	$119.4	$128.6
Endowment Market Value	$447.4	$823.9	$887.5	$1,081.4	$1,184.4	$1,465.4
Endowed Chairs	53	125	164	178	190	199
Endowed Professorships	49	136	201	211	218	256
Federal R&D Expenditures	$75.6	$91.6	$159.9	$184.4	$209.9	$221.7
Extramural R&D Expenditures	$105.2	$147.1	$249.5	$284.4	$309.7	$327.4
Invention Disclosures Received	70	94	92	141	142	157
New Patent Applications Filed	33	50	52	73	86	43
Licenses & Options Executed	6	16	17	15	21	31
Active Licenses & Options	59	67	77	86	116	142
Start-Up Companies Formed	0	6	2	6	7	11

(dollars in millions)

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Kentucky Postsecondary Education Improvement Act of 1997 (HB 1)

National Association of College University Business Officers (NACUBO) Endowment Study

Postsecondary Education in Kentucky: An Assessment – March 1997

The Regional Economic Impacts of the Bucks for Brains Program (Report by Paul Coomes, Ph.D., and Kenneth Troske, Ph.D., October 2007)

Appendix A

Draft

The Regional Economic Impacts of the Bucks for Brains Program

a report for
The Kentucky Council on Postsecondary Education

by
Paul Coomes, Ph.D.

And
Kenneth Troske, Ph.D.

October 15, 2007

DRAFT

The Regional Economic Impacts of the Bucks for Brains Program

a report for
The Kentucky Council on Postsecondary Education

by
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University of Louisville

and

Kenneth Troske, Ph.D.
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University of Kentucky

October 15, 2007

In this report we provide estimates of some of the economic and fiscal impacts of the so-called *Bucks for Brains* program, with emphasis on the University of Kentucky and the University of Louisville.[1] We focus on the external funding attracted by *Bucks for Brains*-supported scholars at the universities, and investigate the ripple effects of the new money on our regional economies and our tax base. We find that:

1. Over the first decade, UK and UL scholars, sponsored in part by the program, have attracted $442 million in funding from federal and other out-of-state sponsors.
2. The combined external funds attracted by *Bucks for Brains* scholars are associated with $762.5 million in sales to establishments statewide (including the university revenues) over the decade. Total associated statewide employee compensation is $278.8 million. And this employee compensation is associated with $19.5 million in Kentucky income and sales taxes, as well as $3.3 million in local occupational taxes. The external funding is now supporting over 2,100 jobs per year statewide.

[1] The economic benefits of higher education extend beyond simply attracting more money, and include more educated citizens, patents, commercialization of ideas, better job opportunities, and enhanced quality of life. See the study: Siegfried, John J., Allen R. Sanderson, and Peter McHenry, "The Economic Impact of Colleges and Universities," *Economics of Education Review* 26 (2007): 546-558, for a recent criticism of estimates from economic impact studies of spending on higher education. In this current study we try to avoid many of the problems discussed in the Siegfrie et al. study. However, this current study still suffers from the basic problem discussed in Siegfried et al. that economic impact studies of higher education fail to capture the primary benefit of additional spending on higher education—more educated citizens and the benefits they provide for the state.

Background

The *Bucks for Brains* program was authorized in 1997, and state government invested $350 million between fiscal years 1998 and 2007[2]. The primary goal of the program was to stimulate university research, external funding, and economic development in the state. The universities matched the public funding with private contributions, invested the dollars, and used the investment income to endow professorships and provide research support. It is important for readers to understand that the state and matching private contributions have not been spent; rather, they have been invested, and only the return on the investment has been spent to support the research agenda. The contributions are all still there, as part of the universities' foundation assets. The assets are managed under the title Research Challenge Trust Fund (RCTF), the legal name of the *Bucks for Brains* program.

The University of Kentucky and the University of Louisville have pursued somewhat different paths to obtain matching money and in their strategies for deploying the investment proceeds. It is beyond the scope of the present report to analyze the institutional decisions[3]. Generally speaking, it seems clear that UL has targeted its RTCF dollars more towards health-related fields, while UK has used the dollars more widely around the institution, in terms of colleges and departments.

The University of Louisville, relatively new to the funded research mission, used its RCTF funds primarily to recruit new faculty in a few health-related fields. For example, 35 of the current 49 endowed chairholders are in the School of Medicine. Nearly all of the chairs in Medicine are held by faculty who came to the university after the RCTF program was established. These faculty often came with major research grants from the National Institutes for Health (NIH), and most have continued to win NIH funding since. Consequently, the University of Louisville raised its NIH funding from $7.8 million in FY97 to $51.5 million in FY06, perhaps the greatest percentage growth of any university in the United States during the period. Most of the other chairholders are in engineering and business, with one each in nursing, dentistry, education, law, libraries, and the provost's office.

The University of Kentucky, already an established competitor for federal research funds in 1997, used its RCTF funds to attract and retain top scholars and to deepen the research infrastructure on campus. UK used its RCTF funds to recruit top scholars through endowed chaired professorships, to retain top scholars through endowed professorships, as well as for student fellowships and scholarships, and for research infrastructure. UK has posted strong growth in overall external funding, from NIH, but also from the National Science Foundation and many other federal agencies and national sponsors. As

[2] In 1998 Kentucky legislators invested $110 million in general fund appropriations to support Bucks for Brains at the state's research and regional universities. They followed commitment with an additional $120 million in 2000 and another $120 million in 2005. Of the total state funds, $200 million have been allocated to the University of Kentucky, $100 million to the University of Louisville, and $50 million to the state's six comprehensive universities.

[3] See www.research.uky.edu/ca/rctf/index.html for some details about the RCTF program at UK, and http://louisville.edu/bucksforbrains/ for the UL program.

with UL, some of this funding was attracted directly to RCTF-funded chairs, while in other cases the RCTF scholar helped attract the funding as a co-investigator and/or simply as a colleague. In this analysis, we are excluding external funding attracted to UK and UL faculty who are not RCTF funded, but who benefit from collaboration with RCTF-funded scholars. It is beyond the scope of this analysis to fully assign causality for the growth in external funding.

External funding to RCTF-funded Scholars

We have organized data on the amount of external funding attracted by UK and UL scholars that have RCTF funding, by principal investigator and by year. These will be considered the 'direct impacts' in our economic analysis to follow. Raw data on funding by scholar, sponsor, and year was provided by the research administration offices of the two universities. These data are 'awards', i.e., counted the year the grant was awarded, not necessarily the year the dollars were expended. External funds include those from federal government agencies, as well as out-of-state industries, foundations, and other universities. Excluded are grants from Kentucky state and local governments, in-state companies, foundations, and universities[4].

The University of Kentucky had a total of 134 RCTF-funded scholars who have received external funding, totaling $250 million over the FY00 to FY07 period. The University of Louisville had a total of 44 scholars, attracting about $166.6 million over FY98 through FY07. We were not able to obtain data for UK scholars in FY98 and FY99, so we estimated it using growth rates for NIH funding to UK in those years, resulting in external funding estimates of $11.3 million and $13.4 million, respectively. Thus, we have a total of $275.1 million to UK and $166.6 million to UL over the decade considered.

Economic impacts

We use the IMPLAN modeling system to estimate the full economic impacts of the new external funds coming to UK and UL. IMPLAN is a well-established regional input-output modeling system, used by thousands of clients, and whose characteristics have been extensively studied and vetted in the academic literature[5]. We use a version purchased in April, 2007, containing the latest estimates of activity by county in Kentucky and surrounding counties in southern Indiana. In the estimates below we use a state-level version of the model. Alternatively, one could look at the economic impact of UK on the Lexington economy, and the economic impact of UL on the Louisville

[4] Data used here on external funding for the University of Louisville are not yet as accurate as those for the University of Kentucky. We are in the process of subtracting grants from in-state sponsors to RCTF-funded scholars. Entries in the table are estimates based on all funding adjusted using a rough estimate of the external-internal mix.

[5] IMPLAN, like nearly all regional input-output modeling systems, is limited in certain well-understood ways. For example, IO models have a linear, fixed coefficient, production recipe, meaning they implicitly assume a company would buy the same mixture of inputs to produce $1 million, $10 million, or $100 million of output. Similarly, wage rates are assumed to be constant, and labor can be purchased in fixed ratios as needed for any production level. Moreover, for less populated areas there is little publicly available data on industry activity and IMPLAN 'estimates' activity based on proxy data and assumed relationships. There is a vast academic literature on these and other limitations. The tool is considered fairly reliable for relatively small perturbations around current levels of activity, but unrealistic for very large changes to the economy.

economy[6]. Effectively this means we are simulating the combined impact of external dollars to UK and UL on vendor and retail purchases throughout the state, ignoring the fact that the two universities are seventy miles apart and operate in two different markets.

We estimate the ripple effects by simulating an increase in new revenues to the input-output sector denoted Colleges and Universities, one of 500 industries detailed in our modeling system. The system does not explicitly distinguish between new revenues from federal research grants, tuition, gifts, etc. So, we are implicitly assuming that the new dollars hitting the university from research grants get spent on average like other dollars received by the university[7].

Estimated Economic and Fiscal Impacts of External Funds Attracted by *Bucks for Brains* Scholars

fiscal years	1998	1999	2000	2001	2002
External dollars attracted					
University of Kentucky	$11,263,867	$13,371,312	$18,126,426	$27,332,956	$33,694,231
University of Louisville	$459,750	$1,823,395	$3,282,150	$14,018,037	$17,771,984
Total	$11,723,617	$15,194,707	$21,408,576	$41,350,993	$51,466,215
Total economic impacts statewide, including universities					
Total output of establishments	$20,238,172	$26,230,224	$36,957,063	$71,383,133	$88,844,775
Total jobs	338.5	438.8	618.2	1,194.1	1,486.2
Total employee compensation	$7,399,789	$9,590,693	$13,512,804	$26,100,187	$32,484,779
Fiscal impacts					
Kentucky state income and sales tax revenues	$517,985	$671,349	$945,896	$1,827,013	$2,273,934
Local occupational tax revenues, Fayette and Jefferson counties	$93,524	$119,375	$167,125	$311,299	$386,961
Total state and local payroll-based taxes	$611,509	$790,723	$1,113,021	$2,138,312	$2,660,896

Estimated Economic and Fiscal Impacts of External Funds Attracted by *Bucks for Brains* Scholars

fiscal years	2003	2004	2005	2006	2007	Cumulative
External dollars attracted						
University of Kentucky	$23,727,916	$32,945,098	$36,395,747	$39,234,494	$38,994,348	$275,086,395
University of Louisville	$16,540,135	$24,285,768	$25,133,523	$28,330,814	$34,983,890	$166,629,446
Total	$40,268,051	$57,230,866	$61,529,270	$67,565,308	$73,978,238	$441,715,841
Total economic impacts statewide, including universities						
Total output of establishments	$69,513,678	$98,796,141	$106,216,363	$116,636,216	$127,706,690	$762,522,455
Total jobs	1,162.8	1,652.6	1,776.7	1,951.0	2,136.2	
Total employee compensation	$25,416,649	$36,123,348	$38,836,443	$42,646,308	$46,694,063	$278,805,062
Fiscal impacts						
Kentucky state income and sales tax revenues	$1,779,165	$2,528,634	$2,718,551	$2,985,242	$3,268,584	$19,516,354
Local occupational tax revenues, Fayette and Jefferson counties	$298,817	$423,527	$456,799	$500,515	$542,082	$3,300,024
Total state and local payroll-based taxes	$2,077,982	$2,952,161	$3,175,350	$3,485,757	$3,810,666	$22,816,379

Most readers will focus on the total cumulative impacts, that is, the estimates in the bottom right hand corner of the table. We estimate that the combined external funds

[6]We actually did the calculations both ways, and there was little difference in the total state impact, so to keep things simple we just report the estimates using the state-level model.

[7] With some accounting research at the institutions we could modify the model to more accurately reflect actual spending profiles related to research dollars, to the extent they differ from average university spending profiles.

attracted by *Bucks for Brains* scholars are associated with $762.5 million in sales to establishments statewide (including the university revenues) over the decade. Total associated statewide employee compensation is $278.8 million. The external funding is now responsible for over 2,100 jobs statewide. The employee compensation is associated with $19.5 million in Kentucky income and sales taxes, as well as $3.3 million in local occupational taxes.

We estimated the tax revenues using effective tax rates. An effective tax rate is calculated as total tax collections divided by total compensation for the relevant jurisdiction. For example, Kentucky state government collected an average of $2.8 billion in individual income tax receipts during fiscal years 2001 to 2005, while employee compensation in the state averaged $74.5 billion. The ratio, 3.78 percent, is a good way to predict state income tax receipts from new employee compensation in the state. A similar calculation was made for state sales and use taxes.

Local occupational taxes are also an important consideration. Jefferson County levies a city-county tax of 1.4 percent on all wages earned in the county, and the public school system levies a tax of 0.75 percent on all wages of residents working in the county. Fayette County levies a tax of 2.5 percent on all wages earned in the county, and the public school system levies a tax of 0.50 percent on all wages of residents working in the county. We divided the historical collections data from these jurisdictions by the employee compensation in the respective metropolitan areas to obtain an effective local occupational tax rate.

Caveat. Note that these estimates of fiscal impacts are not adjusted for any other public funds used to support the RCTF scholars. Not only did the state government invest $300 million directly into the endowments of the University of Kentucky and the University of Louisville, it also made a number of large investments in research buildings and facilities. It is beyond the scope of this report to net all these public funds out and derive a clean return on public investment ratio.